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MAY 8, 1941

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The Iron Age

MAY 8, 1941

ESTABLISHED 1855

8000 Tanks for Hitler

THE coal strike was called on the first day of April, commonly known as April Fool's Day. The date was appropriately chosen.

The effect of the strike upon the steel industry was not immediate, because of existing backlogs of coke and pig iron, modest though they were. But by the third week of April, the operating rate of the steel industry had dropped from 100 per cent, as of the last of March, to 96 per cent. The following week, that ended on May 1, it had dropped two points to 94 per cent.

It will require probably at least two weeks more to get steel production back to 100 per cent again, because furnaces both for pig iron and coke have had to be shut down and you cannot start them up at the drop of a hat, even such a sizable hat as that worn by Coal Dictator Lewis. Roughly figured, the conscientious objectors of the coal industry have set the steel industry back an average of 5 points for a period of at least four weeks.

Our practical capacity for ingot production at a 100 per cent rate is some 1,650,000 tons. A drop of one per cent in weekly production therefore means a loss of 16,500 tons. A drop of five per cent over a period of four weeks means an irreplaceable loss of 330,000 tons. That's a lot of steel.

This estimate of ours is a very conservative one. Republic Steel, for example, states that its own loss will aggregate 100,000 tons alone.

This loss is irreparable and irreplaceable in an industry that is working at 100 per cent capacity. What does it mean?

The loss of 330,000 tons of steel means the equivalent of the steel required for 16 first class battleships. It is the equivalent of more than one quarter of the steel required for our entire two ocean navy program. It represents enough steel to make over 8000 medium tanks or 16,000 fifty-ton steel freight cars. It represents more steel than the automobile industry will save during the remaining months of this year by curtailing car output 20 per cent.

But coal goes into more than steel. Coal is back of the making of all capital goods, and the capital goods index has declined 16 points during April. Coal is back of carloadings in that for one ton of steel alone four tons of materials must be transported. And freight car loadings have declined drastically in April.

Statisticians may say that these are seasonal declines but there are no "open seasons" during an all out defense program.

If the emergency is as great as we are being told daily, and if every minute counts in the battle of Democracy, then it has been nothing less than plain treason to permit the shutting down of our mines for even one day. We have handed Hitler nothing less than a month's handicap in our potential usage of the equivalent of 16 first line battleships or 8000 medium tanks. And that handicap might easily let him win.

J. H. VanDeventer

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Inland research has given industry such valuable steel mill products as: high-strength, low alloy Hi-Steel; lead-bearing, fast machining Ledloy; finer cold reduced tin plate; etc. Inland was among the first to offer the superior quality of sheets and strip made by continuous mills. Inland research has pioneered many steel processing methods and control devices by which steel of finer quality and greater uniformity are made.

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Much More Steel,

By FRANK H. CROCKARD
Consulting Engineer, New York

quickly and inexpensively, without the building of great new plants. Here are many practical ideas—some old, some new, some forgotten—which could be applied within a few months with considerable benefit to the present defense effort. The author is well acquainted with this subject. At one time manager of the Riverside department of National Tube Co., he later was vice-president and general manager of Tennessee Coal, Iron & Railroad Co., and later was president of Woodward Iron Co. More recently his report to Brazil eventually resulted in the $36,000,000 plant now under construction near Rio de Janeiro.

THE extraordinary material requirements imposed by the national defense program have rapidly projected industrial production to record levels of activity. For many years the rate of steel consumption has served as an index measuring industrial virility always finding, whatever the requirements, a ready tonnage response by the steel industry. Currently, however, coupled with the abnormal requirements for "guns," both immediate and prospective, is the significant tonnage required by "butter." Guns, that the country may have adequate defensive weapons; butter, that the country may maintain its expanding national economy in which present living standards may be reasonably satisfied.

Obviously, increased steel requirements flowing from a normal or national growth can and always have been covered either by plant expansion or the construction of new plants. Current emergency requirements, involving many unknown and unpredictable factors, so obscure the problem that such a solution may represent an oversimplification. Equally obvious are the dangers and disadvantages of an all-out policy of expansion. The huge capital expenditure so required would later, with decreased production, impose insupportable charges, further accentuating the unsatisfactory conditions characterizing the last decade. The diversion of materials and equipment of many kinds required would create further scarcities in the capital goods division, retarding the production of urgently required defense equipment. Following the cessation of European hostilities the precipitous drop in steel tonnage requirements would again result in idle plants or greatly reduced rates of activity, conceivably causing insolvency of the weaker steel producers and other associated industrial groups. The labor displacement in these groups would result in a sociological debacle of the first magnitude, presenting a more serious problem than that now confronting the industry.

At the moment, without any dependable guiding instrumentality known to man he is vaguely aware of the appalling speed with which he is driving into an uncharted field in which place and time of arrival are unknown. Based upon the vicissitudinous history of the steel industry, it may be confidently assumed that the competent personnel which has long distinguished the leadership of the industry will, despite these difficulties and undeterred by anonymous propagandists, group pressure, or doctrinaire formulae, wisely effect a reasonable balance in the delicate adjustment of the problems now pressing.

Having briefly and inadequately outlined the case, the writer, from the remote side lines and with great temerity, submits for consideration the following observations relating to facts well known throughout the industry. Some of these mites relate to the comparatively cheap and quick methods of increasing pig iron and ingot production for emergency use. Others relate to probably long trends affecting considerations relating to possible plant extensions.

First, it may be observed that progress in the steel industry as in others is not measured in terms of continuously uniform rates. There are a number of historic periods recording gigantic strides; another such period is seemingly now in the making. Also, the industry has periods marking a predilection for specialization as, for example, the continuous strip or sheet mill, intensive research relating to slag controls, or the chemical and physical development of alloy steels. As a result of these important studies the consumer has been given a group of comparatively new materi-

als without which the many important phases of astounding technological advancement would have been impossible. While the actual tonnage of the alloy steels developed as a result of research represent only a fraction of the total ingot production, it is also true that the production, quality, and uniformity of the larger tonnage of carbon steels has been greatly improved as a result of collateral research.

In the meantime, because of specialized research, the old dependable blast furnace which is the primary source of all steel production, and the Bessemer process and plant which gave the country its railroads, buildings, bridges and agricultural machinery, have been relatively neglected. Axiomatically, any substantial improvement affecting blast furnace operation or economies must necessarily extend over the entire range of steel products.

When Gayley in 1904 disclosed the startling results produced by dry blast in his classic demonstration at the Isabella furnaces he faced an incredulous world. Later the remarkable increase in production, decreased fuel consumption, reduction of flue dust, and uniformity of pig iron resulted in the installation of nine plants in the United States. These installations occupied much space; capital requirements were great; operating and maintenance costs were comparatively high. Concurrently, the growing interest in the utilization of blasts furnace gas resulted in the operation of the blast furnace in the dual role of iron and gas producer as a source of energy for driving blowing engines and plant generators. The urge for fuel economy thus abated and the dry blast was consigned to the limbo of forgotten good things.

Progress since that time in air conditioning methods has led to the simplified modern plant. Of very compact design it requires much less space, less capital expenditure, great dependability, attractive operating and maintenance costs, along with little supervisory control. The bulky brine coils and their containing chambers as used by Gayley have been replaced by a simple concrete chamber in which the air is cooled and the moisture condensed by direct contact water sprays. All entertainment is effectively eliminated by static baffles. These sprays maintain a 40 deg. F. dew point, indicating a moisture content of about 2.85 grains per cu. ft. There are, therefore, no defrosting or de-icing periods with the accompanying loss of energy due to the partial insulation caused by ice on the former brine coils. The ponderous reciprocating steam engines, required as ammonia compressor drives, have been replaced by either steam turbines or electric drives, with very close automatic regulation of either type. (See Fig. 1.)

Three successive installations (with the fourth under construction) of the modern dry blast plant in which dehumidification is effected before compression, have thoroughly demonstrated their dependability and practicability in the Birmingham district. The result of this uninterrupted demonstration of a means for controlling the fundamental operating conditions necessary in the blast furnace and open hearth has transferred long cherished conceptions from dreamland to the world of stern reality. The steel industry will ever be increasingly indebted to Gayley for his early masterly appreciation of the broad significance of blast control. His dramatic demonstration was unfortunately a quarter of a century in advance of the times. It has remained a neglected tool of extraordinary importance, ranking with the mixer, but compelled to await the development of a cheaper and more practical plant, the pressure of more rigid specifications, and a more comprehensive appreciation of the disturbing effects of mutables—including free air as influencing iron and steel operations.

In making moisture comparisons between northern and southern areas it is a well-known fact that the humid and dry seasons in the North have their turning points during April (humid) and October (dry), whereas in the southern areas the humid season extends over a longer period. This apparently favorable balance for the southern area with reference to dry blast operations is not supported by Gayley's figures. While the northern humidity is lower during the dry season, the per centage variation in moisture is greater than during the humid season.

Gayley at Isabella reduced coke consumption and improved quality at a dry blast furnace compared with a sister free air furnace, although the winter was of unusual dryness. He attributed the results to furnace regularity in which the zone of fusion was controlled instead of bouncing up and down the bosh, alternately building up and removing scabbing material which interfered with uniform furnace operation, including quality of iron. Since power charges represent the principal operating cost, it will be found through much of the dry season, unlike the Gayley cycle, in the present design the compressor will be often idle, as free air frequently contains less than 2.85 grains per cu. ft. (the minimum moisture attainable with direct sprays). In order to uniformly maintain this desirable moisture constant it would be necessary to use only sufficient energy (steam) for humidification instead of dehumidification.

10 Per Cent More Production

Such an installation would increase iron production 8 to 10 per cent for a given furnace and reduce annual fuel consumption a like amount. Expressed differently, the application of dry blast to a hypothetical group of 10 furnaces of equal capacity would produce a tonnage equivalent to an additional furnace. Decreased fuel consumption would relieve coke oven requirements.

Realization of these objectives would be secured with lower capital, much less time, and decreased operating labor requirements.

So much, then, for a relatively cheap, quickly available method of securing additional emergency pig iron requirements.

However, regardless of emergency requirements, there are other considerations of utmost importance indispensable in further metallurgical progress. These may be briefly stated as below:

(1) Reduced fuel and limestone requirements. Primarily a coal conservation measure protecting the high grade coking coal deposits. More strictly this may be regarded as an economic rather than a metallurgical consideration. As it affects final costs it is here included.

(2) Increased physical temperature of the pig iron, permitting the use of lower silicon metal, shortening the blow and decreasing converter loss.

(3) Decreased ladle skulls.

(4) Decreased scruff.

(5) Lower sulphur content in the pig iron.

(6) More uniform control or regularity of sulphur and silicon in the pig iron.

(7) The use of controlled pig iron in the mixer would level chemical variations in mixer iron, adding (as a guide to the blower) increased significance to "mixer analysis," where the iron does not always "mix."

Bessemer and open hearth practice, long current, in which the characteristics of the pig iron are not more rigidly controlled lead to the well-known primary causes of irregular steels as induced by variations in silicon, sulphur and metal temperature.

The well-known complexity of the open hearth slag metal system with its interrelationship of numerous variables in which there are comparatively slight variations, require in precise operations the greatest possible control of these mutables. Present rigid chemical and physical specifications of an endless type of tailored steels tend to increase the production of misfit heats. Such heats represent perfectly sound steel, but they just do not meet the specifications; and unless they are remelted they must be stocked and rehandled for later disposition, which frequently is not promptly possible.

In minimizing the production of such heats it is essential to uniformly maintain such oxidation conditions that the several deoxidizers will regularly produce interchangeable steels of the particular type desired. Effectuation requires close silicon control if the type of slag required is to be controlled without subsequent bath additions, an operation requiring both time and lime. The second step or adjustment pertains to sulphur regulation which is also another time, lime consumer. The importance of sulphur content and its segregation because of its deleterious influence in rolled products has been accentuated by the enormous increase in flat rolled products. These elementary facts are so well known that any elaboration is needless. The justifiable conclusions relating to the use of controlled pig iron in the open hearth are: Decreased melting time; decreased lime; decreased fuel; decreased refractories; decreased deoxidizers; decreased misfit heats; decreased rejections of rolled products; and decreased preparation costs of billets, blooms and slabs.

While the importance of controlled iron in the open hearth is well recognized it may, because of different metallurgical characteristics, exert more important influence in Bessemer operations. Compared with the open hearth, the Bessemer conversion of iron proceeds with lightning rapidity. In acid Bessemer the only available slag (the character of which is determined by the composition of the metal) is the silicate of iron and manganese resulting from the oxidation of impurities in the iron, in which respect it differs with the open hearth where slag formation and regulation occurs over a comparatively long time. Acid Bessemer slag as an agent in the removal of sulphur is inactive. The reduction in weight of the Bessemer charge following the removal of impurities by oxidation tends to increase rather than decrease sulphur content. Low sulphur steels in the Bessemer can be secured only by the use of low sulphur iron. Notable variations of silicon in the iron affect the quality of the steel despite temperature adjustment by coolants in the converter. The sensible heat of the iron which is a function of the molten temperature may also cause significant variations in bath temperature and quality of the steel.

The primary control of these important factors is determined largely by blast furnace operations, the product of which, with existing and continuing variations, prevents the realization of more precise Bessemer operations with "flame" and iron control.

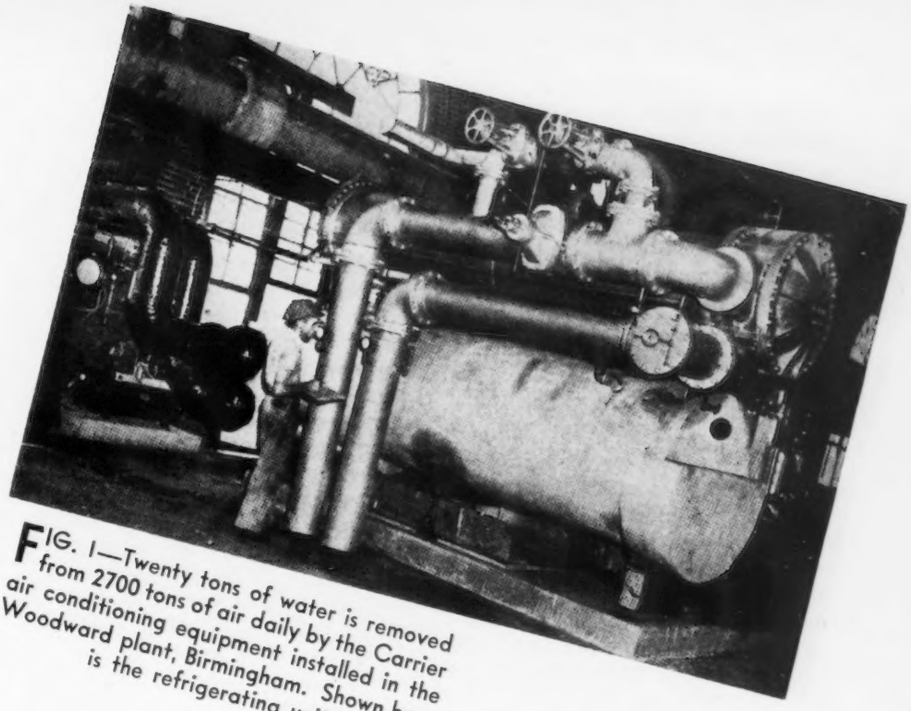

FIG. 1—Twenty tons of water is removed from 2700 tons of air daily by the Carrier air conditioning equipment installed in the Woodward plant, Birmingham. Shown here is the refrigerating unit.

° ° °

Since the introduction of the process by Bessemer and Mushet the only important metallurgical advance during its long history is the recent development and application of "flame control" in which the "electric eye" or photo cell more accurately and uniformly determines the end point and the degree of variation in oxidation required to regularly produce the various grades of steel within the range of the Bessemer process.

Great Promise for Bessemer

The use of the photo cell has reduced the number of off heats, decreased ferro manganese requirements, increased ingot yield, and most importantly, is a means of closely regulating predetermined ranges of physical properties. This scientific approach in the production of Bessemer steel has strongly silhouetted the basic need of controlled metal with reference to both composition and temperature if the further economic utilization of this tool is to be hastened and extended.

A survey of these well-known facts indicates that the value of controlled iron in the Bessemer, when endeavoring to secure the greatest possible advantages offered by the photo cell, may exceed that of the open hearth. The advantages of controlled Bessemer metal are: Decreased blowing time; decreased power; increased yield; decreased refractories; decreased

off heats; decreased rejections of rolled products; and decreased preparation cost of billets, blooms and slabs.

Other possible and desirable Bessemer controls are herein mentioned in connection with Bessemer plant design.

Another factor affecting increased blast furnace production, fuel economy and greater regularity is that relating to the furnace stock line. Regarding this subject there has been much conversation, many literary contributions, and masterly field inactivity. During a decade the hearth expanded from 14 ft. to 18 ft.; by 1924, 22 ft. had been attained. The largest hearth now measures 28 ft. 6 in. Concurrently, marked advances in mechanical auxiliaries, the development and application of various recording instruments, increased blast, higher stove temperatures, cleaner gas, the preparation, grading, stocking and charging of raw materials were other contributions responsible for increased production and smoother working. The evolution of the blast furnace, including its lines and technique, is the result of careful studies, later expressed in brilliantly successful experimentation conducted primarily for the purpose of securing a more efficient and smoother working furnace.

The notable lag in progress relates to the inadequacy of the big bell with respect to distribution at the stock line. Mechanical top charging has satisfactorily solved peripheral distribution but with the discharge of the big bell uncontrolled forces work havoc with radial distribution. The furnace engineer when using the conventional bell and hopper is limited to the use of dimensions out of proportion to the increased hearth requirements of the modern furnace.

Adequate increase of these dimensions result either in the formation of excessive central areas of increased porosity and greater gas permeability or the failure to protectively seal the walls with fine stock. The existing condition, therefore, is somewhat similar to the installation of a 1000 hp. boiler over a 1500 hp. stoker. High stoker efficiency is attained at the cost of low boiler efficiency or per contra. Fig. 2 (*Iron and Steel Engineering*, January, 1941) showing the evolution of the modern furnace clearly reflects the influence of this imposed limitation. By 1920 the earlier hearth-bosh ratio of unity or more had decreased to 0.92, while in 1939 the ratio further dropped to 0.72. Other and larger hearths have smaller stock lines. This enforced throat contraction leads to high gas velocities, excessive dust carryover, improperly or irregularly prepared stock, high fuel consumption and decreased production. For years the use of the big bell other than a gas seal has been an anachronism. With large hearths its continued use is insufferable.

The primary function of the blast furnace is the reduction of iron ores and the production of a molten at the lowest possible cost. The blast furnace plant, including boilers, blowing engines, stoves and coke plant requires large capital, maintenance and obsolescence charges. Other factors being equal the coke rate determines molten production. The secondary use as a gas producer, therefore, limits the attainment of the first objective by imposing the consumption of the extra coke required in the production of fuel gas. In so doing, additional impurities are charged in the form of coke sulphur, phosphorus ash and increased flux stone. Their removal in part is accommodatingly affected by the use of the expensive plant required to furnish hot blast at relatively high pressures. The results are decreased tonnage, the week-end surplus of furnace or coke gas which is not always most profitably utilized, and the earlier depletion of high grade coking coals. Substitution of cheaper secondary coals in less expensive gas producing plants, or the use of other fuels when economically available, would furnish a more readily controlled fuel supply with higher heat value, permitting faster heating, reduced cost of gas mains, regenerators and recuperators now used in preheating the air or gas.

Regarded only as an iron maker and therefore ignoring considerations relating to the fuel value of the gas, it is apparent that the blast furnace as a result of defective radial stock distribution and restricted throat area is now operated in contravention of the elementary laws of physics and chemistry. Some of the widely recognized fundamental requirements are: Homogeneous stock mixture; and uniformity of gas composition in a given zone, gas temperature in a given zone, gas velocity in a given zone, gas pressure in a given zone, and time.

Abundant data relating to isotherms, isobars, gas pressure, composition and velocity confirm the regular irregularity of these factors.

The satisfactory completion of any reaction is closely related to the time element, which in a moving mass as in the blast furnace is a function of volume. The excellent results attending slack blast operation during the depression attest the importance of the time factor. Highly accelerated modern driving requires corresponding volumetric increase in order to effectuate preliminary reduction by the uniform distribution of gases possessing uniform characteristics throughout a given plane of the stock column, in which the gas solid contact should be consistently intimate. Under these conditions preliminary reactions will be largely completed at temperatures in which the CO, CO_2 equilibrium ratio exist at suitable temperatures for indirect reduction in the upper portion and lower zones of the stack, minimizing the secondary reactions affecting solution loss after the familiar formulae

$CO_2 + C = 2CO$ (—41600 cal.)

a reaction which is not appreciable below 900 deg. to 1000 deg. C. The second solution loss accompanies the reaction of iron oxide,

$FeO + C = Fe - CO$ (−39300 cal.).

These reactions not only steal carbon but being highly endothermic abstract heat in the lower and bosh sections just where heat absorption affects hearth temperature. It is, therefore, of the utmost economic importance to effect the greatest possible reduction of ore high in the furnace in order to avoid the formation of CO_2 formed in the higher temperature zones which so greatly contribute to solution loss.

New Blast Furnace Bell

How ineffectively this result is being accomplished is disclosed by the careful investigations of the U. S. Bureau of Mines (Technical Paper No. 442, p. 130) in which it is stated, "the results indicate that only 24.4 per cent of the reduction is being done in the shaft of the furnace, whereas 75.6 per cent is being done in the hearth and bosh."

In an attempt to secure wider throats and substantially amelio-

rate, without hope of securing an homogeneous stock column, the writer has devised the arrangement schematically shown in Fig. 3. The main feature is the use of a fixed supplementary distributor functioning as a secondary bell in the form of a hollow truncated cone, coaxial with the bell. The top diameter of the frustrum being larger than that of the bell. The distributor is suspended by hangers, F.F, pendant from the metal dome cover, G.G. Encircling the cylindrical hopper extension is the

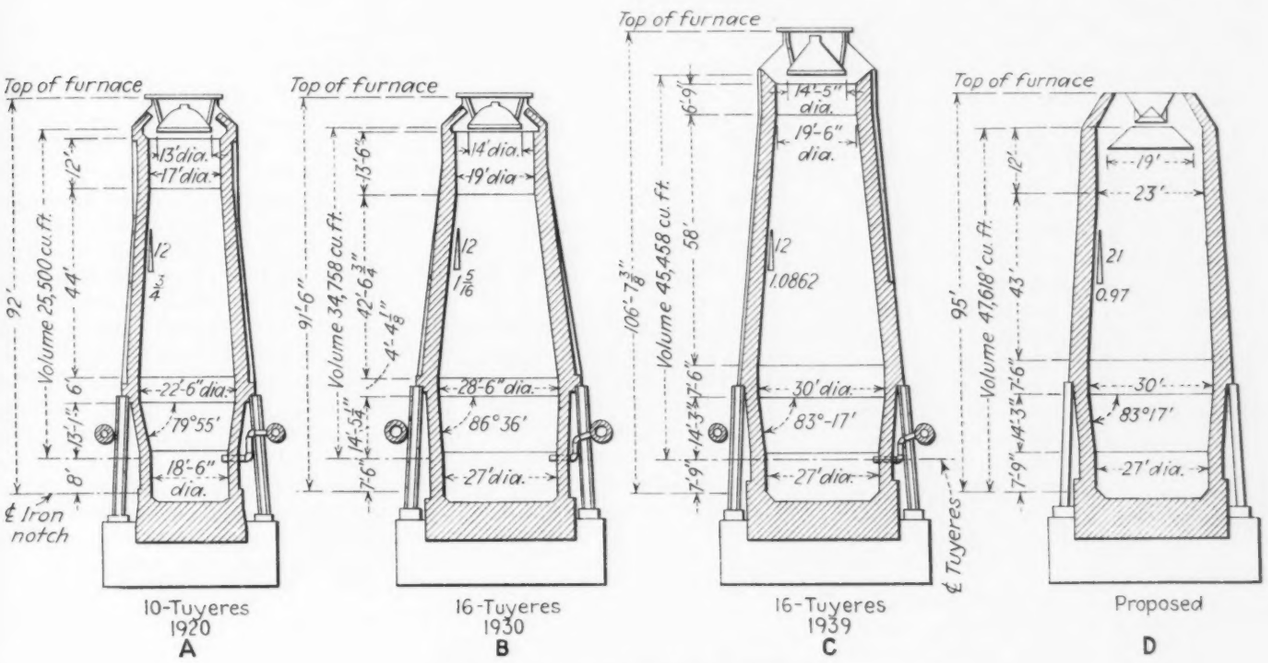

FIG. 2—These diagrams show the lines of successive rebuilds of the modern blast furnace.

downwardly and upwardly movable barrier or sleeve, C, attached to operating suspension rods (heavy tubes), E.E, passing through gas sealed opening in the cover plates.

In charging operations the bell is dropped to position A. The stock, flowing freely from the hopper, cascades over the distributor and its gas louvre to the peripheral annulus. In proper charging sequences the sleeve C is lowered to the level corresponding with the upper plane of the frustrum, forming an extension of the hopper, preventing the flow of hopper stock until the bell enters further into the frustrum, where stock flows into the central annulus during the progressive descent of the bell to position B. By following proper charging sequences the central stock column crater can be regulated to permit controlled variations in the porosity of the core, thereby assisting in more uniform distribution of the ascending gases in a stock column of improved homgeneity.

The effect upon furnace lines following the use of this arrangement or its equivalent is shown in Fig. 1, in which the volume of D is greater than C, which is 11 ft. higher than D. Here the diameter of the distributor is about equal to the stock line diameter of C. The respective areas are as 298 to 433, an increase of 46 per cent; the favorable effect upon flue dust production is apparent.

The hearth-throat ratio has been restored to the more normal value of 0.85.

Removal or replacement is made by the removal of cover plate G.G.

Stack lines related to these proposed proportions would for the first time demonstrate the real or actual hearth capacity of the modern furnace before reaching that stage now known as "over blown."

While these dimensions could not be secured in existing stacks, a very substantial volumetric increase can be obtained by the substitution of 22-in. walls for the heavier walls now used. The increased volume resulting would be gainfully utilized in ore reduction, instead of providing room for inert brick work. The long belated exploration of the stack section promises results with respect to cost and quality, in which *over all* economies ranging from coke plant to rolled products are large and obvious.

The use of the Bessemer converter as a means of greatly increasing ingot production, either in the duplex or triplex process, has been regular practice at some plants for 30 years.

The production of synthetic Bessemer iron, derived from the use of a mixture of low phosphorus scrap with the addition of sufficient ore and flux required in the formation of an adequate slag volume, has been in successful operation for more than 20 years. The smelting of such a mixture results in enormously increased iron production from a given stack.

Here, then, are two methods which, when compared with the installation of additional open hearth furnaces, offer with minimum investment, shortened construction time, and decreased labor requirements a flexible means of cheaply and quickly increasing ingot tonnage.

The writer is keenly aware that in recording these well-known facts

as relating purely to methods of quickly increasing production they are rather barren or humdrum. Viewed in broader perspective as relating to proposed construction or as determinative influences upon long trends in the steel industry they are of fascinating interest and great economic importance.

The term Bessemer steel as hereinafter used refers to steel made in a Bessemer converter from iron of suitable chemical and physical composition, as conducted in an adequate plant controlled by those highly skilled in the arts of conversion, teeming, heating and rolling. This limitation perforce excludes some steels which may have passed through a Bessemer converter.

Bessemer steel characteristics, including great stiffness and high tensile strength for a given carbon content, ready weldability, machinability or free cutting, its satisfactory behavior at the draw bench, and its special wear quality or wearability, as in shafts or axles, are superior qualities not so combined in other steels. These characteristics distinguish Bessemer steel as a unique material of inherent worth. It differs from open hearth steel in cold working response. Corrective adjustment of composition and finishing refinements present problems of research.

Technical discrimination respecting appropriate application, coupled with aggressive sales activity would reclaim much lost tonnage. Other increments of magnitude based on price consideration would result in the displacement of open hearth steel when physical requirements could be equally or better served by Bessemer. Bessemer steel of greater uniformity and higher quality, including the now possible reduction of the phosphorus content below present standards, when and as required, will further extend its field.

The vigorous development of an American acid Bessemer process paralleling the extraordinary growth of the basic Bessemer of Continental Europe and England would conserve national fuel supplies and afford reciprocal economic advantages to producer and consumer in domestic and export markets.

The earlier consumer demand for a low phosphorus steel was served by the adoption of the open hearth process. Because of the large tonnage back flow of steel scrap generated by the converter during its dominancy, a suitable and adequate raw material supply was cheaply available at costs less than pig iron. The larger investment in blast furnace and coke plant was unnecessary. On this base the open hearth was built and now rests. The future scrap trend is uncertain. It is certain that the extinction of the Bessemer process which produces more scrap than it consumes, would decrease the scrap supply, bringing further unbalance. The continuing expansion of the electric arc or induction furnace will further decrease open hearth supply. The use of the electric furnace in the production of special or carbon grades of steel in areas affording cheap assemblage of raw material and the distribution of the resulting rolled products within the same area presents a new steel trend. This trend will be further encouraged or stimulated by the availability of cheap current generated at Federal power plants, and cheap fuel distributed by natural gas or oil lines. The increasing use of alloy or non-corrodible steels is not a helpful scrap factor. Improved methods of protecting steel surfaces either with metals or pigments will further contract scrap flow. Much, perhaps all, of the large steel exports during the war period are beyond domestic scrap reclamation. Apparently the era of an adequate cheap supply of scrap is ending. If this is so, consideration of the Bessemer process, either in connection with the production of Bessemer steel or its use in duplexing, is of importance at this time.

Ore Supply Increased

One of the factors contributing to the decline of the Bessemer process was the anticipated comparative scarcity of Bessemer ores. Paradoxically with these changed and changing conditions it will be found that the ore tonnage available for Bessemer use has been greatly increased. Bessemer steel can be, and is now commercially produced from iron carrying 0.30 per cent phosphorus. The Tata Iron & Steel Co., Jamshedpur, India, for years large producers of low carbon steels, has recently adopted the Perrin process in which iron containing 0.30 per cent phosphorus is blown in an acid Bessemer converter. The blown metal is dropped from considerable height into the casting ladle, containing a very basic molten slag. Dephosphorization is immediate and satisfactory—0.03 to 0.035 per cent phosphorus. Their new specially arranged Bessemer plant eliminates the use of the open hearth previously required in duplex operations (Yaneske, *British Iron and Steel Institute*, September, 1940).

In an American plant blown metal containing 0.150 per cent phosphorus was reduced to 0.06 per cent, by the use of a dry dephosphorizer consisting of 50 per cent calcined lime, 30 per cent scale, and 20 per cent fluorspar. In their 8.5-ton heats carrying 0.100 per cent phosphorus the use of 500 lb. per heat of this mixture reduces the phosphorus content to 0.030 per cent. The resulting steel possesses, among other desirable qualities, characteristics superior to either open hearth or standard Bessemer, making it valuable for special applications (Gordon Yocum, *Metals* Tech., T.P. 1265 January, 1941).

This adaptation of the acid Bessemer converter in the use of non-Bessemer iron is a comparatively new development in which more extended experience will bring further refinement and wider application. There is, however, a very large potential ore tonnage of Bessemer grade which will later be available in standard Bessemer practice, as will be indicated.

It is probable that the next decade will witness the peak of high grade Lake ore shipments. Deficiencies will be replaced by the beneficiation of the billions of tons of low grade ores. The large deposits of lean magnetites will with magnetic concentration yield high grade Bessemer ore. Important deposits of magnetite in other regions will contribute further supplies. Other ores of the hematite class will be available either by magnetic concentration after roasting, present hydraulic methods, or entirely new concentrating techniques.

The gradual replacement, in this manner, of the present large production of high grade ores will in the aggregate require huge capital expenditure of more than casual interest with respect to the capital structure of integrated companies. These capital charges augmented by the continuing beneficiation costs will manifestly increase ore

costs at the mine. Partially compensatory credits will flow from transportation savings and economies effected at the blast furnace by the use of beneficiated ores. Additional compensatory credits of much larger significance, during and following the inevitable trend outlined, are those of lower steel cost (operating and capital) made possible by expanded Bessemer or duplex operations. Further independence of scrap market vagaries would be a weighty factor in market stabilization.

Basically, the proposal resolves into a defensive cost policy. To the extent that steel costs are reduced, the industry would to the same degree gain protection against intermarket competition of other metals or synthetics.

The past performance of the Bessemer process requires no apologia other than to note that it was born and reared without benefit of that efficacious modern tool known as research. Refinements of the Bessemer as a process or the work treatment of steel were unknown to producer and user. The present Bessemer plant is of a pattern designed 25 years or more ago. A belated recognition of these conditions should secure for the Bessemer the very reasonable request that it now be given precisely the same treatment so profitably accorded the open hearth; namely, adequate research support with modernized plant providing flexibility of facilities required in economically applying the more recent technological findings, and their further development and utilization as dictated by research. Pending this development it will be impossible to intelligently approximate the probable limits of Bessemer production. The same generous support given the open hearth, if extended to the acid Bessemer process, should result in the renaissance of a comparatively neglected process by which the much more wasteful basic Bessemer, with its huge English and Continental tonnages, should be relatively exceeded.

The production of good steel by any known steel process requires raw material of suitable and uniform chemical and physical characteristics. The sensitivity and importance of precisely controlled Bessemer operation has been briefly mentioned in connection with the production of controlled iron. The obligation and responsibility of fulfillment of this primary requirement obviously rests with the blast furnace department. The Bessemer takes over in the accurate determination of molten temperatures, and the correct weighing of all materials used in the converter or ladle.

The acid Bessemer offers the following recognized advantages:

(1) Decreased capital requirements for the production of a given tonnage.

(2) Decreased ingot cost.

(3) Facility with which open hearth production can be greatly boosted by duplexing during periods requiring extraordinary output of open hearth ingots.

(4) Production flexibility, permitting wide daily variations in output, with less dislocation in leveling labor quota.

(5) Greater adaptability in the production of small or special heats compared with the open hearth.

(6) Ability to supply steel markets requiring the particular qualities possessed by various Bessemer grades.

(7) More uniform soaking pit or heating practice because of synchronization of converter and bloomer. "Bunched" open hearth heats disturb uniform heating conditions.

(8) Conservation of coal supplies.

(9) Compact plant.

(10) Short preparatory period required to reach capacity following periods of idleness.

In designing a modernized Bessemer plant it is improbable that the huge Pierce-Smith converter used in copper practice can be satisfactorily adapted to steel practice. Size limitations of the conventional type are mechanical rather than metallurgical. The use of 45-ton basic Bessemer converter with the accompanying larger slag volume has been German practice since 1931 (Hoesch-Eisen & Stahlwerke, Dortmund, Westphalia).

50-Ton Converters

There should be no experimental or formidable problems in the development of a 50-ton acid converter. The use of such a vessel would reduce charging and pouring time for a given tonnage. Larger heats would reduce the number of different sets of physical or workability levels per unit of production. This desideratum would more closely approach open hearth practice by consolidating two 50-ton heats of the same grade in a 100-ton casting ladle. By eliminating this needlessly weak spot caused by the present small heat Bessemer practice it would be possible, with the assistance of flame and other controls, to more quickly develop a greater technical consumer appreciation of the important special characteristics of Bessemer grades, and a more discriminating but wider application.

Other problems of design relate to blast connections and considerations relating to blowing costs which constitute an important item in "cost above." The costly pres-

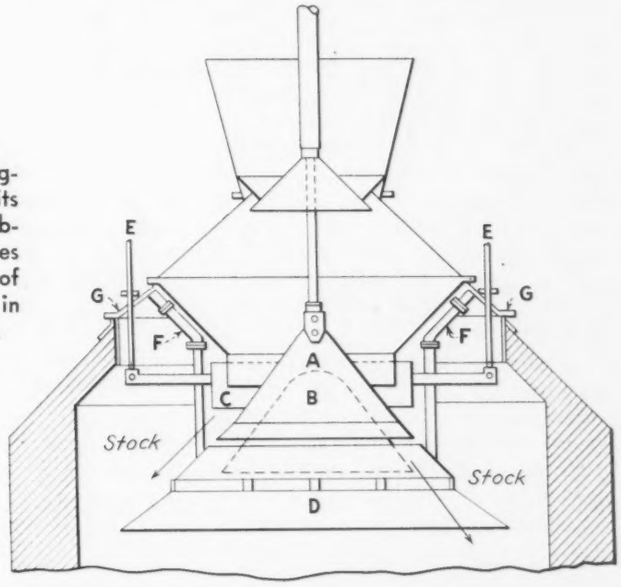

FIG. 3—This charging device permits wider throats and substantially ameliorates the homogeneity of the stock column in the blast furnace.

sure drop occurring at the converter disk valve, trunnion and wind pipe, ranging from 7 to 9 lb., represents a drop of about 20 per cent of the initial pressure. The use of two trunnions of generous diameter instead of one as in conventional design, larger valves of improved design and larger blast pipes to the wind box are obvious correctives. Independent blast line to each converter with by-pass connection to the spare converter will permit controlled blast pressure, which is impossible when using a common line.

Another energy loss results from maintaining blast pressure in excess of that required by the ferro static head and the necessary dynamic action of the blast. The proper distribution of additional tuyeres for the same blast volume will reduce excess pressure, while the activity of the increased tuyere area will also reduce blowing time. Incidentally, the adoption of this modified tuyere plate would increase output at some Bessemer plants now pushed for emergency production.

Wind box leakage of irregular and indeterminate volume is another source of loss, preventing more accurate estimation of the time or blast volume required following an established end point.

Additional field data should be derived relating to the optimum length of tuyere, in order to reduce bottom refractory costs and the time lost in bottom changes. The present design of tuyere orifice defies all considerations of efficiency known to man or nature.

If delicacy of the essential thermal control of the molten metal is to be practically realized it will be necessary to straight-line humidity and temperature constants of the blast. The modern dry blast spray system as used in controlled blast furnace operation is equally available for converter use. For the control of blast temperature it is suggested that the neglected converter gases be used in heating a low pressure boiler installation, serving as a feed water heater. The waste gases from such a plant in their passage through a brick checker system, serving as a heat reservoir, would by the use of a metal recuperator, preheat a portion of the total volume required. An automatic mixing valve as used in blast furnace practice, admitting the heated air into the main blast line would maintain a uniform but very moderate blast temperature. High blast temperature would increase scrap carrying capacity or permit the further reduction of silicon in the molten. Until the effect of high temperature upon trunnion bearings and tuyere life could be determined, the moderate straight-line temperature objective could be realized without affecting converter practice.

The use of commercial oxygen if and when it becomes economically available could be advantageously used during the early portion of the foreblow, decreasing blowing time and silicon requirements.

The converter tilting mechanism must at all times have sufficient capacity to quickly "up" the vessel in order to avoid tuyere filling caused by an increased area of tuyere exposure. It must also be able to handle the vessel under any condition of unbalance caused by lining erosion or kidney accumulations; otherwise the elapsed time from end point to pouring position would introduce an intolerable time variant seriously affecting the precision of flame control.

Spacious provision should be made for reladling if and when necessary, or other requirements following research developments relating to post converter operations in the further refinement of the bath.

A Bessemer plant consisting of two 50-ton converters and a spare converter stand should produce approximately 5000 tons of steel per 24-hr. day. The production of such a large tonnage in the concentrated Bessemer area will require a very radical modification of the pouring methods now used at either the Bessemer or open hearth plant. After pouring, the heat will be promptly conveyed by ladle trucks carrying insulated ladles to a teeming hall.

Obviously of the several possible methods, each arrangement will be determined by the preferences of the engineer and the Bessemer management. Any arrangement should embody the known but not always realized essentials for the production of sound ingots. Without delaying converting operations, it should be possible to permit the ladles to remain standing long enough to thoroughly complete ladle reactions and effect the greatest possible elimination of non-metallic inclusions, after which teeming at one of a plurality of teeming tracks and stations would follow.

These teeming tracks should be sufficient in number to permit the teeming of low or high carbon steels on their respective tracks: Also, for separating the various sizes of molds, standard, special or slab molds. By so doing, greater discrimination could be exercised in the assignment of mold track standing time before delivery to the stripper. Bessemer teeming station facilities should permit the utilization of the costly experiences and the ever increasing finesse of the open hearth and electric furnace in the production of sound steel.

The use of a tundish in a favoring environment would decrease the ferro-static pouring head, decrease mold splashing and liberate some gases now carried into the molds. A multi-nozzled tundish would diminish the curse of too fast teeming or improper pouring temperatures, the evils of which are so well recognized. This practice would increase Bessemer operating costs slightly, over-all costs would be reduced as a result of fewer cracked ingots, reduced preparatory cost of blooms and slabs, and decreased mill rejections.

It is the writer's belief that the methods suggested, some old and some neglected and some new, would permit a consolidation of production and quality gains extending from the blast furnace to finished product. In this way will be found, through the lower cost of mass production, greater protection in the disruption of the domestic and world steel markets following cessation of hostilities. Most importantly, the production of Bessemer steel will have become for the first time in its history a scientific process and not a highly skilled art. The application of controlled operations with suitable equipment permitting the reproducibility of given grade of steel possessing uniform and stabilized characteristics will reclaim much of a lost steel market. Undeveloped uses or applications following lower costs and improved quality, as in all basic industries, will result in greater profits for the producer and expanded benefits to the ultimate consumer, the public.

Foundrymen Prepare for New York Meeting

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THE necessity of exchanging production data during this period of peak production, and the many extra-curricular activities offered by the City of New York, will undoubtedly attract a record group of foundrymen to the 45th annual convention of their Association, in New York, the week of May 12.

Composed of some 35 sessions, covering the practical and scientific advancements of the industry, the information obtainable at the convention has been so prepared as to appeal to all types of foundrymen, including shop executives, engineers, research workers and management. An unusually imposing group of experts in their respective fields has been secured to present papers on a variety of interesting phases of foundry work, many touching on problems important in the National Defense Program.

The excellent facilities available in Hotel Pennsylvania, convention headquarters, for the holding of all types of meetings, together with the fact that all A.F.A. activities will be confined to the hotel, will be of definite advantage to those attending. Such an arrangement makes it possible to secure easily the information desired by individual foundrymen.

As the program appended herein indicates, presentation of papers and committee reports will begin on Monday, May 12. Gray iron, malleable and non-ferrous meetings of various types as well as shop operation courses will be held on Monday and Tuesday. Wednesday, May 14, has been designated as the day for the annual Board of Awards lecture and business meeting, and the annual Association dinner. The Board of Awards is selecting an outstanding national speaker as the Awards lecturer. Sessions on steel and gray iron castings will be held on Wednesday and Thursday with the shop operation courses continuing throughout the entire four days.

Scattered throughout the program are sessions of general interest. For example, foundry training, a most important subject, will be emphasized at the apprentice training session, with W. E. Patterson, Federal Committee on Apprenticeship, speaking on "Apprentice Training in the Defense Program." The A.F.A. Committee will discuss, as a symposium, related instruction for the pattern and foundry apprentice.

Safety and hygiene will be discussed at a special session by Roger Williams, assistant director, Inspection and Safety Service Department, New York State Insurance Fund. This meeting will be a continuation of the series developed under the auspices of the Safety and Hygiene section of the A.F.A.

The four major Gold Medal awards of the Association for meritorious service are to be made to four men who have made outstanding contributions to the advancement of the foundry industry.

This year the awards are:

The Joseph S. Seaman medal to Charles Edgar Hoyt, executive vice president and manager of exhibits of the American Foundrymen's Association. The award to Mr. Hoyt is being made for his exceptionally outstanding service to the foundry industry as manager of the foundry exhibits since 1908, as secretary and treasurer of the Association from 1918 through 1936, and as executive vice president since 1936.

The J. H. Whiting medal to Donald J. Reese, engineer, Research & Development Division, International Nickel Co., New York, for his outstanding contributions to the foundry industry and the Association through his work in the improvement of cupola melting methods.

The W. H. McFadden medal to Max Kuniansky, general manager, Lynchburg Foundry Co., Lynch-

burg, Va., for outstanding contributions to the gray iron industry and the Association.

The John A. Penton medal to Fred L. Wolf, technical director, Ohio Brass Co., Mansfield, Ohio, for his outstanding contributions to the non-ferrous and malleable castings industry and the Association.

Such awards are made annually for meritorious service to the foundry industry and the Association on the recommendation of the A.F.A. Board of Awards. These four major awards are gold medals provided for by funds donated in 1920 by four pioneer officers of the Association, each medal being named for one of the donors.

In addition to the medal awards, the Association will recognize the long continued service and early pioneering work in the technical development of the industry as carried on by Henry M. Lane, Grosse Isle, Mich., by making Mr. Lane an honorary life member.

The technical program is as follows:

Monday, May 12

9:00 a.m.—Registration.

10:00 a.m.—Annual sand control shop course:

Non-Ferrous Foundry Sand Control. Discussion leader, H. M. St. John, Crane Co., Chicago.

10:00 a.m.—Foundry refractories:

Some Observations on Malleable Furnace Refractories, by J. A. Kayser, Laclede-Christy Clay Products Co., St. Louis, Mo.

Firestone as a Cupola Refractory, by F. J. Wurscher, Acme Steel & Malleable Works, Buffalo, N. Y.

Electric Furnace Refractories, by C. A. Brashares, Harbison-Walker Refractories Co., Pittsburgh.

11:30 a.m.—Annual gray iron foundry shop practice course:

Cupola Practice and Equipment. Discussion leader, Donald J. Reese, International Nickel Co., New York.

2:00 p.m.—Malleable founding:

Graphitization of Cementite in Cupola White Iron, by N. A. Ziegler, W. L. Meinhart and A. J. Deacon, Crane Co., Chicago.

Velocity of Conversion of Austenite to Ferrite and Cementite, by H. A. Schwartz and M. K. Barnett, National Malleable & Steel Castings Co., Cleveland.

Flame Hardening of Malleable Iron, by Stephen Smith, Air Reduction Sales Co., New York.

2:00 p.m.—Non-ferrous founding:

Gating and Risering Non-Ferrous Castings, by R. R. Clarke, General Electric Co., Erie, Pa.

An Experiment in Efficient Crucible Melting, by G. K. Eggleston, Barnes Mfg. Co., Mansfield, Ohio.

Effects of Furnace Atmospheres in Non-Ferrous Melting, by J. M. Kelly, Westinghouse Electric & Mfg. Co., E. Pittsburgh.

2:00 p.m.—Foundry safety and hygiene:

3:00 p.m.—Chapter delegate conference:

4:00 p.m.—Foundry costs:

Variable Budget in the Foundry, by E. C. Bumke, Oliver Farm Equipment Co., South Bend, Ind.

Cost Committee Report on Classification of Cost Divisions.

4:30 p.m.—Annual lecture course:

Core Practices and Theories, by H. W. Dietert, Harry W. Dietert Co., Detroit.

7:00 p.m.—Chapter officers' dinner:

7:00 p.m.—Engineering instructors' dinner:

A University Course in Foundry Control Methods, by Fulton Holtby and H. F. Scobie, University of Minnesota, Minneapolis.

The Foundry Industry and the Engineering Graduate, by R. F. Harrington, Hunt-Spiller Mfg. Co., Boston.

Tuesday, May 13

9:30 a.m.—Annual sand shop control course:

Malleable Foundry Sand Control. Discussion leader, D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn.

10:30 a.m.—Non-ferrous founding:

Magnesium Foundry Alloy Practice, by M. E. Brooks and A. W. Winston, Dow Chemical Co., Midland, Mich.

Silicon-Iron Bronzes, Their Foundry Qualities and Physical Constants, by E. G. Jennings and Harold J. Roast, Canadian Bronze Co., Montreal, Que.

Aluminum-Copper-Magnesium-Zinc Casting Alloys, by L. W. Eastwood and L. W. Kempf, Aluminum Co. of America, Cleveland.

10:30 a.m.—Malleable founding:

Malleable Iron in the Defense Program, by J. H. Lansing, Malleable Founders' Society, Cleveland.

Observations on the Duplexing of Malleable Iron, by G. A. Schumacher, Albion Malleable Iron Co., Albion, Mich.

10:30 a.m.—Gray iron founding:

Gating and Risering for High Pressure Work, by H. H. Judson, Goulds Pumps, Inc., Seneca Falls, N. Y.

Effects of Moisture and Preheating of Cupola Blast on Gray Cast Iron, by J. T. Eash and R. E. Smith, International Nickel Co., Bayonne, N. J.

Melting in the Cupola—A Summary of Certain Papers on Combustion Theories, by S. C. Massari and R. W. Lindsay, Association of Manufacturers of Chilled Car Wheels, Chicago.

10:30 a.m.—Apprentice training:

Apprentice Training in the Defense Program, by W. F. Patterson, Chief of Apprenticeship, Division of Labor Standards, Washington, D. C.

Related Instruction for the Foundry and Pattern Shop Apprentice—A Symposium:

(a) *What May Be Taught the Foundry Apprentice as Related Foundry Instruction*, by A. L. Armantrout, Carnegie-Illinois Steel Corp., Chicago.

(b) *What May Be Taught the Foundry Apprentice as Related Pattern Instruction*, by K. F. Ode, the Falk Corp., Milwaukee.

(c) *What May Be Taught the Pattern Apprentice as Related Pattern Instruction*, by Frank C. Cech, Cleveland Trade School, Cleveland.

(d) *What May Be Taught the Pattern Apprentice as Related Foundry Instruction*, by Geo. Gedeon, Aluminum Co. of America, Cleveland.

Jobs in the Foundry, by A. F. A. Committee, chairman A. H. Wornom, Newport News Shipbuilding & Dry Dock Co., Newport News, Va.

12:30 p.m.—Malleable division round table luncheon discussion:

12:30 p.m.—Non-ferrous division round table luncheon:

Causes of Porosity and Leakage in Non-Ferrous Castings, by A. H. Hesse, Naval Research Laboratory, Anacostia Station, Washington, D. C.

2:00 p.m.—Job evaluation and time study:

Job Evaluation and Merit Rating, by A. L. Kress, National Metal Trades Association, Chicago.

Practical Time Study Measurements for Foundry Operation, by Phil Carroll, Jr., New York.

2:00 p.m.—Sand research—steel foundry sands:

Progress Report on Investigation of High Temperature Properties of Steel

H. S. SIMPSON

Former Vice-President and New President, A.F.A.

SAM TOUR

Chairman, Metropolitan Chapter Convention Committee

C. E. HOYT

Executive Vice-President, A.F.L., and Recipient of the Joseph S. Seaman Gold Medal.

Sands, by J. R. Young, Cornell University, Ithaca, N. Y.

Some Properties of Foundry Sands at High Temperatures, by G. W. Ehrhart, Cornell University, Ithaca, N. Y.

Synthetically Bonded Steel Molding Sands, by R. E. Morey and H. F. Taylor, Naval Research Laboratory, Anacostia Station, Washington, D. C.

Report of Committee on Foundry Sand Research.

3:30 p.m.—Annual gray iron foundry shop course:

Gating and Risering. Discussion leader, E. J. Carmody, Chas. C. Kawin Co., Chicago.

4:30 p.m.—Annual lecture course:

Core Practices and Theories, by H. W. Dietert, Harry W. Dietert Co., Detroit.

7:00 p.m. — Apprentice supervisors' dinner:

8:00 p.m.—Cupola melting of scrap:

An informal discussion on Use of Scrap Iron in the Cupola, Sponsored by Cupola Research Committee.

Wednesday, May 14

9:30 a.m.—Annual sand control shop course:

Gray Iron Shop Control. Discussion leader, C. W. Thompson, New Jersey Silica Sand Co., Millville, N. J.

10:30 a.m.—Annual business meeting and awards presentation:

Awards address by S. Wells Utley, Detroit Steel Castings Co., Detroit, and Past President, American Foundrymen's Association.

1:00 p.m.—Steel division luncheon:

2:00 p.m.—Sand research:

Dry Sand Molding Procedure for Heavy Castings, by W. A. Hambley and A. Lebesh, Allis-Chalmers Mfg. Co., Milwaukee.

Testing Foundry Sands and Its Coordination with Molding Results, by J. J. Boland, Griffin Wheel Co., Chicago.

Clay Slurry Additions for Molding Sand Rebonding, by R. H. Mooney, Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich.

Reproducibility of Tests of Foundry Sands, by Stanton Walker, National Industrial Sand Association, Washington, D. C.

2:00 p.m.—Patternmaking:

Cooperation Between the Pattern Shop, the Engineer and the Foundry, by E. J. Brady, Western Foundry Co., Chicago.

Use of Tin Forms in Molding Practice, by W. A. Smith, Smith-Richardson Mfg. Co., Geneva, Ill.

2:00 p.m.—Foreman training:

Foreman Training for the Defense Program, by Glenn Gardiner, Forstman Woolen Co., Passaic, N. J., and Elliott Service Co., New York.

2:30 p.m.—Steel founding:

Converter Developments, by A. W. Gregg, Whiting Corp., Harvey, Ill.

Use of Models in Improving Steel Casting Practice, by S. W. Brinson, Norfolk Navy Yard, Portsmouth, Va.

Report of Committee on Heat Treatment of Steel Castings.

3:30 p.m.—Annual gray iron foundry shop course:

Electric Furnace Melting in the Gray Iron Foundry. Discussion leader, A. E. Rhoads, Detroit Electric Furnace div., Kuhlman Electric Co., Bay City, Mich.

4:30 p.m.—Annual lecture course:

Core Practices and Theories, by H. W. Dietert, Harry W. Dietert Co., Detroit.

6:00 p.m.—Annual A.F.A. dinner:

Address by Dr. Allen A. Stockdale, National Association of Manufacturers, New York.

Thursday, May 15

9:30 a.m.—Annual sand control shop course:

Steel Sand Shop Practice. Discussion leader, W. G. Reichert, American Brake Shoe & Foundry Co., Mahwah, N. J.

9:30 a.m.—Annual gray iron foundry shop course:

Causes of Casting Defects and Remedies. Discussion to be led by members of Gray Iron Division Committee on Analysis of Casting Defects.

10:30 a.m.—Gray iron:

Effects of Pouring Temperatures on Mechanical Properties of Cast Iron, by V. A. Crosby, Climax Molybdenum Co., Detroit.

Some Factors Influencing Graphitizing Behavior of Cast Iron, by S. C. Massari, Association of Manufacturers of Chilled Car Wheels, Chicago.

Effect of Ladle Inoculation on the Solidification of Cast Iron, by J. T. Eash, International Nickel Co., Bayonne, N. J.

Notes on the Undercooling of Gray Cast Iron, by Alfred Boyles, Battelle Memorial Institute, Columbus.

10:30 a.m.—Plant and plant equipment:

Sand preparation by the Wet Method, by Howard Mason, Symington-Gould Corp., Depew, N. Y.

Centrifugal Casting and Equipment, by N. Janco, Centrifugal Casting Machine Co., Tulsa, Okla.

Cupola Dry Blast Equipment and Process, by F. M. Johnson, Surface Combustion Corp., Toledo.

10:30 a.m.—Steel founding:

Mechanism of Pin-Hole Formation, by C. E. Sims and C. A. Zapffe, Battelle Memorial Institute, Columbus.

Report of Committee on Radiography, by C. W. Briggs, Steel Founders' Society, Cleveland.

2:00 p.m.—Gray cast iron:

Development and Control of Engineering Gray Cast Iron, by R. A. Flinn, American Brake Shoe and Foundry Co., Mahwah, N. J., and D. J. Reese, International Nickel Co., New York.

Heat Treatment of Cast Iron, by C. A. Nagler and R. L. Dowdell, University of Minnesota, Minneapolis.

2:00 p.m.—Steel founding:

The Fluidity of Carbon and Alloy Cast Steels, by H. F. Taylor and E. A. Rominski, Naval Research Laboratory, Anacostia Station, Washington, D. C., and C. W. Briggs, Steel Founders' Society, Cleveland.

Report of Committee on Methods of Producing Steel for Castings.

4:00 p.m.—Annual lecture course:

Core Practices and Theories, by H. W. Dietert, Harry W. Dietert Co., Detroit.

Gates and Risers

By W. B. GEORGE
R. Lavin & Sons, Inc., Chicago

—For copper tin bronzes and red brasses. These data represent considerable research and are strictly factual. And the presentation is such as to be of real value to the average foundryman. This article is essentially what was presented orally at the recent Indianapolis meeting of The American Foundrymen's Association.

IN order to understand the technique required in the proper placing of gates and risers, it is necessary to first obtain a clear picture of just what is taking place within the casting.

The first particles of metal to solidify within the mold are in crystal form, as shown in Fig. 1, which in the progress of solidification arrange themselves in dendritic patterns, illustrated in Fig. 2. In properly fed castings these patterns are completed into grains throughout the entire mass and bound together, as shown in Fig. 3. When castings are improperly fed, many grains are not completed and porous spots are found within the castings. This is illustrated with Figs. 2 and 8. Should the section be of large size, it is found that this dendritic structure has collapsed, leaving a shrink hole, as shown in Figs. 13, 21 and 22.

In the building of a sound house, it is necessary to use solid material. It is the same in the making of a casting—it is imperative to have grain completion or dendritic structures result in some cases, and shrink holes in others, which correspond with unsound material in the building.

In order to bring about a sound grain structure throughout the entire casting, the metal must be solidified directionally from the farthest point of the mold, toward the gate or riser. This directional solidification is like laying the bricks from the foundation to the roof. Each brick or grain is fitted properly to support the following one.

These grains, when properly fed, adjust themselves to fit each other, as well as the contour of the casting.

There are two general types of grains, one being columnar and the other equal axial: Fig. 4a illustrates columnar grains; Fig. 4b. illustrates equal axial; Fig. 4c illustrates columnar and equal axial grains, both in the same casting.

As a rule, columnar grains predominate in copper-tin and red brass alloys, while equal axial grains predominate in the manganese and aluminum bronzes. This paper, however, has no bearing on manganese or aluminum bronze alloys.

The size of the grain is governed by the cooling rate. Slower cooling develops a larger grain. Since large grain sizes are not desired, it becomes necessary to pour metal as cold as possible and still feed the casting. In practice, this temperature varies from 1800 deg. to 2300 deg. F., depending upon the size and shape of the casting. Test bars are generally poured at 2150 deg. F.

Fig. 9 illustrates directional solidification in its most ideal form. There is about 300 deg. F. drop in temperature from the heavy to the light end in a wedge 12 x ¾ x ⅜ in.

Fig. 10 illustrates a disk, for instance, 12 in. in diameter and 1 in. thick. If the top and bottom surfaces should be machined and liquid or air pressure should be applied at the center, it would leak in most cases. Upon fracturing, there would be found a coarse dendritic structure at A, minus the necessary grain boundaries. On further

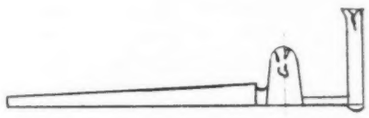


FIG. 9

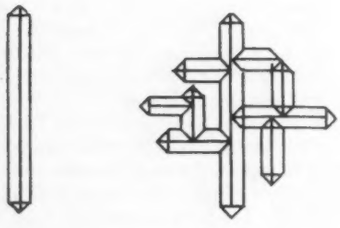
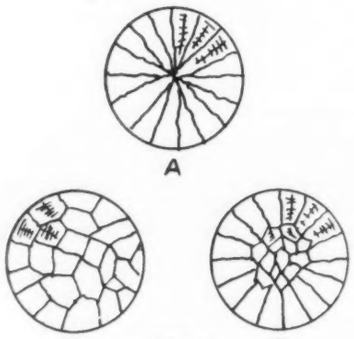


FIG. 1

FIG. 2

FIG. 3



A

B FIG. 4 C

examination of the structure, it is found that solidification started from the surfaces B, shutting off the effect of the risers. In order to obtain a sound casting of this type, it is imperative to start solidification in the center, and the risers should feed toward it. This may be

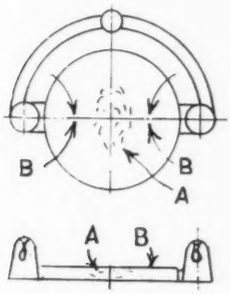


FIG. 10

accomplished by the use of a chill shown as X in Fig. 11, or lightening of the center, as described in Fig. 12.

Fig. 13 illustrates the use of a riser upon a boss or hub of a cast-

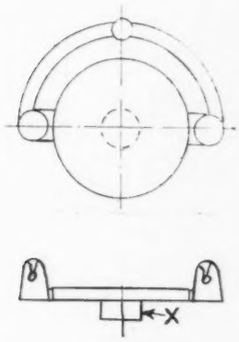


FIG. 11

ing where the neck is too small. As the neck freezes before the boss or hub, the result is an internal shrink at A.

Fig. 14 illustrates the same hub or boss with sufficient riser which

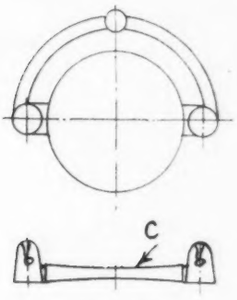
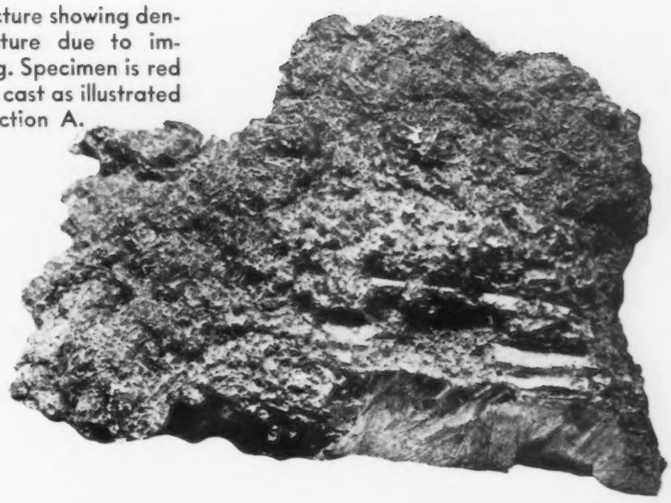
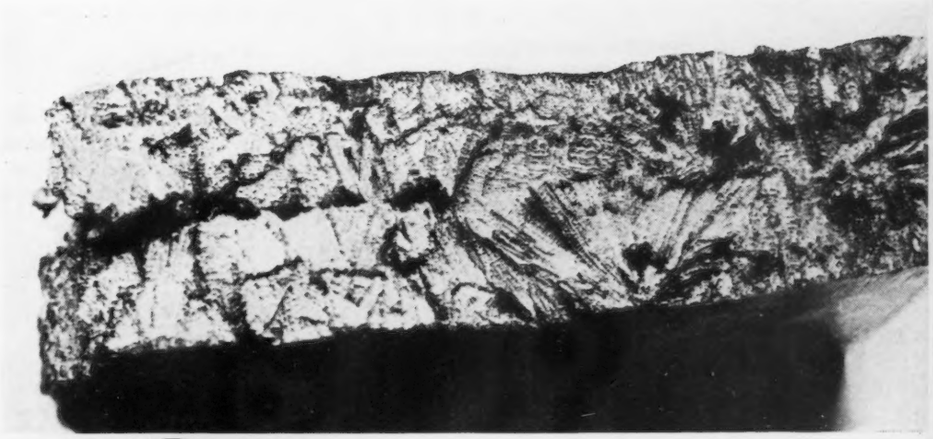


FIG. 12

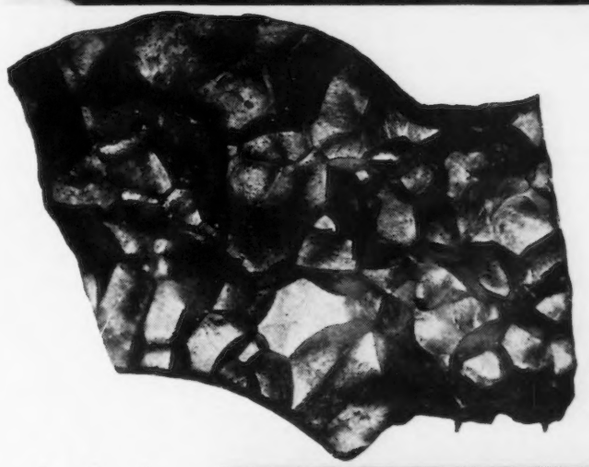
FIG. 5—Fracture showing dendritic structure due to improper feeding. Specimen is red brass and was cast as illustrated in Fig. 22, Section A.





ABOVE

FIG. 6 — General arrangement of columnar grains brought out by hot fracture. Specimen is of a low grade brass.



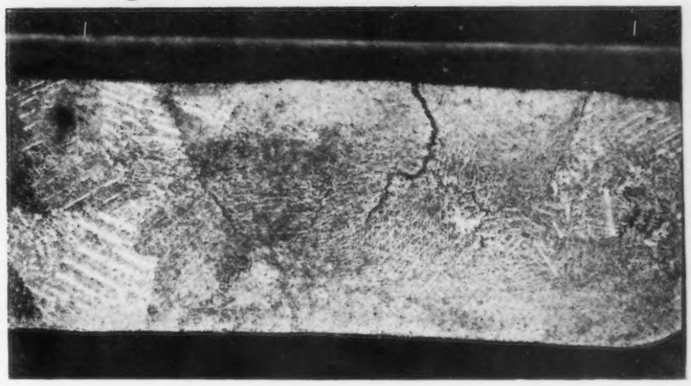
LEFT

FIG. 7—Arrangement of equal axial grains brought out by hot fracture. Specimen is of aluminum bronze.

° ° °

RIGHT

FIG. 8 — Dendritic structure of the part of a pressure casting that leaked, showing incompleted grains. Material is copper-tin bronze.



will not freeze off, but which will keep up the directional flow of liquid metal until the mass of the casting has become solidified.

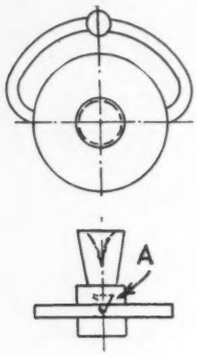


FIG. 13

Fig. 15 shows the use of the horn gate. Fig. 16 illustrates a pouring box with "pencil gates."

It should always be borne in mind that the hottest metal must exist in the riser. In order to accomplish this, it becomes necessary to either gate into the riser or fill

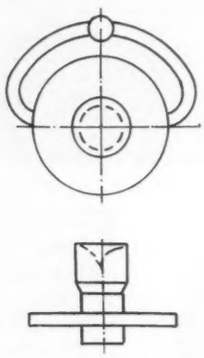


FIG. 14

it with hot metal after the casting is covered.

Fig. 17 shows a large casting poured from the bottom with an internal shrink due to cold metal being forced to the top.

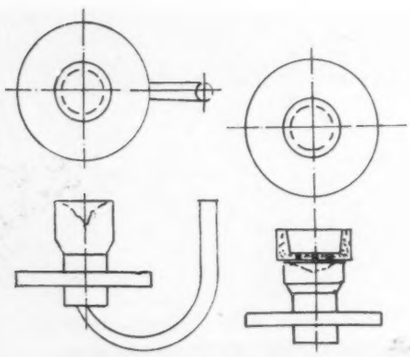


FIG. 15 FIG. 16

Fig. 18 shows the same casting with risers too far apart, and porous spots at B.

Fig. 19 shows design for a ring riser with side gates for this class of work.

Fig. 20 illustrates an ideal method for the pouring of large castings. By this method the metal is

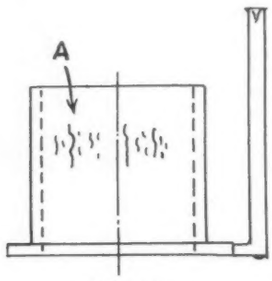


FIG. 17

ladled into the pouring box which has a number of small pencil gates. These pencil gates relieve the strain, hold back the dross, and govern the rate of pour.

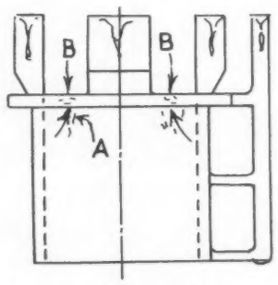


FIG. 18

Fig. 21 illustrates bottom gating of a solid bar, say, for example, 6 in. in diameter and 16 in. long. The result is shrinkage in the side A and center B.

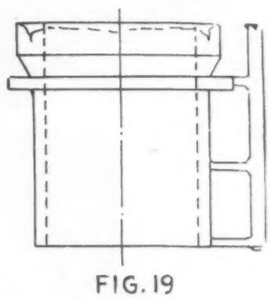


FIG. 19

Fig. 22 shows the same bar with improper riser, resulting in internal shrinkage at A.

Fig. 23 shows this casting with top riser and side gate, which is satisfactory.

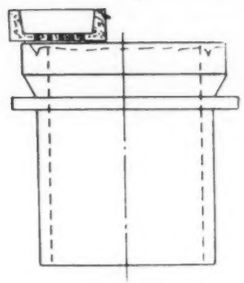


FIG. 20

Fig. 24 shows ideal method to cast large, solid bars. The pouring box with the pencil gates can be developed to govern rate of solidification.

Many times castings are seen which are gated as shown by Fig. 25. This is a poor method since the coldest metal remains in the riser. The result is a porous spot at A.

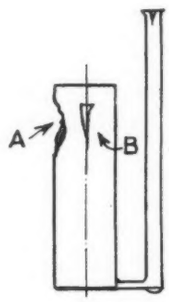


FIG. 21

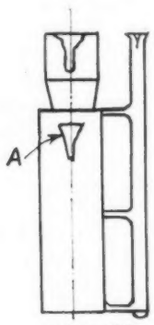


FIG. 22

Fig. 26 is the preferred method since the hot metal is where it is needed.

In Fig. 27 is shown the result when hot metal does not reach the riser farthest away from the gate. The defect is porosity shown at A.

Fig. 28 shows the proper gate with hot metal going into all risers.

In making many classes of work, it often becomes necessary to gate on the thin wall of the casting. This should be followed out with consideration for the wall thick-

FIG. 23

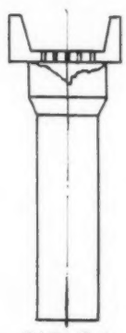


FIG. 24

ness; a little forethought here will save many castings.

Fig. 29 illustrates a gate that is too large for the wall to which it

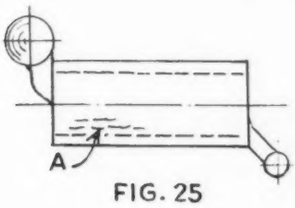


FIG. 25

is attached, with the result of an internal shrink at A.

Fig. 30 illustrates a draw B on the internal wall of the casting from a gate that is too small.

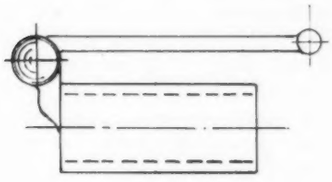


FIG. 26

Fig. 31 illustrates a draw on the external surface of the casting due to lack of a proper fillet.

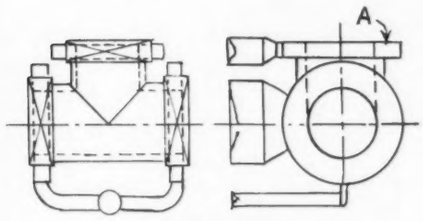


FIG. 27

Gates on thin wall castings must be designed so that they are a part of the casting itself, and must be

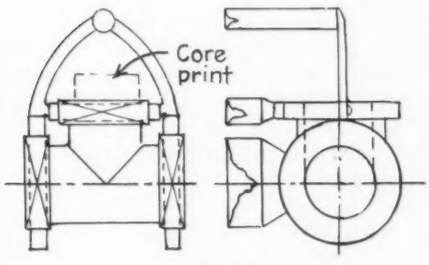


FIG. 28

neither larger nor smaller than the wall to which they attach. The fillet radius between the gate and the casting should be one-half of the wall thickness.

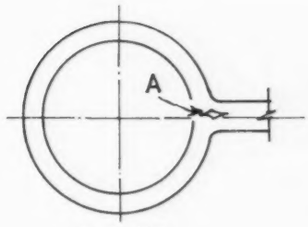


FIG. 29

Fig. 32 illustrates the proper proportion.

Different Types of Gates

In addition to feeding castings, gates can be made to perform mechanical skimming effects.

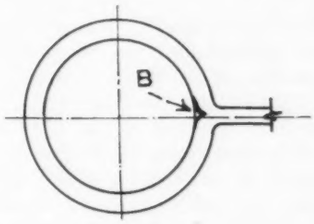


FIG. 30

Dirt and drosses will separate from the metal wherever it changes its course of direction or drops its velocity within the mold. Gates used to accomplish this effect are

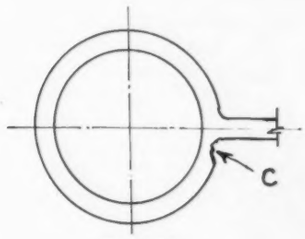


FIG. 31

generally known as strainer, choke, skim or whirl gates.

Fig. 33 illustrates a pouring box with pencil gates, and is recommended for all top pouring.

Fig. 34 is a choke gate used on

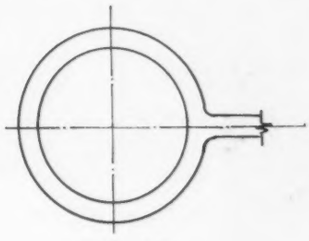


FIG. 32

most work to hold back dross and to keep the sprue full.

Fig. 35 shows a skim core, novel in design, but seldom used, although efficient when utilized as a choke.

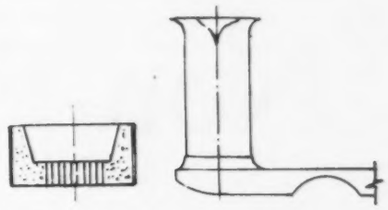


FIG. 33 FIG. 34

Fig. 36 is a strainer core placed in the gate and used by many foundrymen.

Fig. 37 shows the whirl gate with the dross thrown out at A.

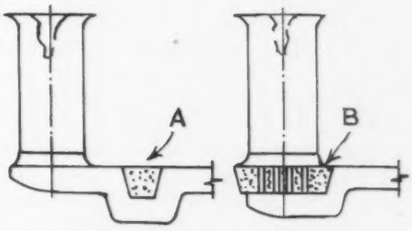
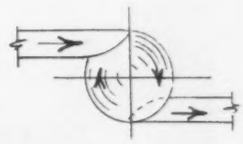


FIG. 35 FIG. 36

Fig. 38 shows a horn gate which has many advantages on such work as gears, propellers, etc.

There is no limit to the material which can be written about gates and risers, and this paper is only



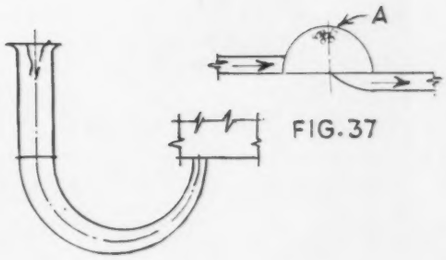


FIG. 37

FIG. 38

meant to lay down the fundamentals for a better understanding of the directional solidification that is required for the making of sound castings in tin bronzes and red brasses.

Top Pouring Methods for

Non-Ferrous Castings

HEREIN are valuable data on the application of top pouring methods to commercial castings such as may be met with in the non-ferrous jobbing foundry. Many factors are dealt with, as for instance the different feeding practices, gating systems, avoidance of dross, etc. These data were first presented orally at the regional conference, American Foundrymen's Association, Milwaukee.

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WHILE most theoretical considerations of risers and gates apply to castings without regard to their size, general interest is concerned with the gating of larger castings only. For, in the majority of cases, small castings are both filled and successfully fed by the same channel system that constitutes the gate. A little thought will show that in many cases this gate fulfills all of the factors found necessary for the satisfactory production of larger or more complex castings. There is also to be considered the fact that the industry is satisfied with less perfection in many small castings and is inclined to overlook minor shrinkage in small parts that are not highly stressed.

Consideration of the idea of top pouring brass and bronze castings began with the publication of a paper on the subject by Brisbois and Cartwright in 1938 at the national convention of the American Foundrymen's Association, regarding the successful manufacture of different castings in high shrinkage alloys and in the silicon bronzes. Frankly, the writer is skeptical after reading this paper as to the quality of castings that would result from the procedure described. Principally doubted is the ability of ordinary types of molding sand to withstand the severe erosion to be expected when molten metal was dropped through the risers onto mold surfaces. However, repeated, and more careful perusal of their paper leads to the belief that the suggested methods were theoretically sound, and so desirable as to make a trial worth the expense.

When the necessary functions of gates and risers are considered, most observers would be in quite close agreement. For instance, first consider gates. While a gate may serve as a source of feed to the casting, that is the function of a riser. The prime function of the gate itself is to supply molten metal to the cavity at a desired rate of speed, without in itself introducing any source of dirt or dross. By this is meant that the gate shall not be cut by erosion and thus supply sand that will enter the mold cavity, and it must not agitate the metal in any manner that will form dross which may appear later as a defect in the casting. Particularly note that it is not said that "A gate must not agitate the metal." Agitation in itself, without the oxidation that is the source of dross, is harmless. The function of a riser is to supply molten metal to the casting in such a way that no part of the casting will remain liquid after the riser is frozen. The riser must "make up" any shrinkage occurring within the casting at the expense of its own solidity. This function is often performed by a gate, which may make the cutting of a separate riser unnecessary.

It is necessary also, to differentiate between the types of metal

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FIG. 1—In this 80-10-10 bushing, a striking plate was provided for the falling metal and pains were taken that the mold was set in a vertical position to allow entering metal to fall without scouring the sides.

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that are to be cast. Normally, the metal types are arbitrarily divided into two classes: First, the high shrinkage alloys such as aluminum bronze, manganese bronze, and pure copper; second, those considered to be low shrinkage alloys, such as the tin and tin-lead bronzes. Shrinkage of these different materials is different in form rather than in amount. Microscopic examination of such materials as government bronze, 88-8-4, shows that when this material is cast in small parts, which the average foundryman says are "too small to shrink," the shrinkage is present to a considerable degree as minute voids between the grains or within the arms of the dendrites. This is a distributed shrinkage, and is characteristic of the so-called low shrinkage alloys. It is this condition that the writer believes to be normally responsible for the golden fracture these castings may exhibit.

Where the alloy used is one of the leaded group, such as 80-10-10, the color of the fracture may be found to be changed by the lead content, but it can still be ascribed to the same source. The writer is of the opinion that high shrinkage alloys do not have a great deal more volume shrinkage in freezing than the low shrinkage alloys, but because of their mode of solidifying, caused by their short freezing ranges, the shrinkage is found to be concentrated in one spot. The result is, that the produced castings are normally more sound where properly fed, but require better feeding to eliminate the obvious shrinkage. Those foundries that have had occasion to make pressure castings of manganese or aluminum bronze, will likely agree on this point.

Different Feeding Techniques

Because of the difference in behavior of these two types of alloys, there is a somewhat different mechanism in feeding them to produce sound castings. The high shrinkage alloys are, contrary to popular opinion, easily fed where adequate risers are used, and where the location of the riser is properly chosen. A greater proportion of the risers on these alloys is available for feed than in the low shrinkage alloys. When the freezing of a low shrinkage alloy of the 88-8-4 type is considered, it is found that the first step in freezing is the formation of a spongy mass of dendrites or tree shaped crystals having between them small openings of microscopic size. During the early parts of solidification, these openings are filled with liquid metal having a lower freezing point than the solid portions and which on anaiysis will prove to be markedly higher in its content of tin

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By ARTHUR K. HIGGINS

Metallurgist, Allis Chalmers Mfg. Co., Milwaukee

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and zinc. These variations in composition will in many cases amount to 2 per cent of the tin and 1 per cent of the zinc. Because of the small size of these capillary openings it is extremely difficult to force the metal through them for any great distance to make up the shrinkage in the extremities of the casting; likewise, because of the already solid skeleton frame work of the crystals, continued shrinkage does not result in the appearance of its characteristic signs on the surface of the casting.

It becomes much easier to feed alloys of this type when abundant amounts of a low freezing point constituent are present. This is found to be true and notably so, in the case of the leaded alloys such as 85 copper, 5 tin, 5 lead and 5 zinc, 80 copper, 10 tin, and 10 lead, and 75 copper, 10 tin and 15 lead. Where adequate risers are provided it is much easier to get sound tight castings of these alloys than of the lead free alloys, since the lead, remaining liquid longer than the remainder of the alloy, is able to fill the pores by percolation from the riser. At the same time, castings of these materials may show extreme porosity due to shrinkage in localized hot spots cut off from feed by risers.

When such simple castings as straight walled cylinders set in a vertical position are considered, it is not difficult to picture the temperature conditions that must prevail during the casting and freezing of these forms. First, consider the conventional gating of such castings. The metal is introduced through a gate cut to the bottom of the casting and as it rises in the mold, it must continually flow past the same points. This will, of course, result in a cooling of the metal stream and heating of the mold surface. It is found that during the filling of the mold, the metal flowing farthest from the gate reaches the lowest temperature and that the sand farthest from the gate is heated the least. The metal near the gate, not having any body of sand to warm, retains its temperature. However, the sand near the gate, having been heated by the entire volume of the metal, attains its highest temperature and is unable to extract additional heat rapidly from the metal in its vicinity. If the cylinder is large, one or more risers may be placed at its upper edge. It is common practice to fill these risers with hot metal after the body of the casting has been poured. Where the ratio

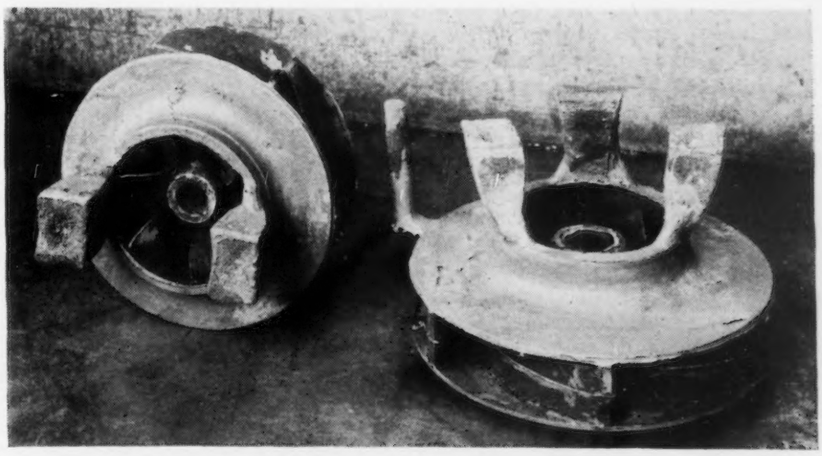


FIG. 2—If entering metal is poured through risers applied to the heavy section of this centrifugal pump impeller, cracking can always be cured without the use of excessive temperatures.

of the length of the cylinder to wall thickness is high, such risers are worse than useless and will result only in the so-called drain lines that are frequently found in such applications.

To get back to the earlier statement that the hottest metal is closest to the gate and the colder metal at the most distant points of the castings, it is obvious why the risers are not effective. It is because of the attempt to feed the hot bottom portions of the cylinder, which will therefore solidify last, by means of risers which are unable to pass liquid metal through the colder upper parts of the cylinder walls. This is equally true with cylinders of large diameter cast in a horizontal position. On machining such castings a line of shrinkage drain, often unrecognized as such will be found about the middle of the casting if it be vertical, and along the parting line if the casting be made in a horizontal position. Shrinkage drain may, in some cases where it is not too severe, be partially compensated by the use of the leaded alloys, but it may appear even in these alloys. The cure for this condition would seem theoretically to be quite simple. And so it is—the metal should be poured into the mold in such a way that the hottest metal is nearest the riser and the coldest metal is farthest from it.

Many complicated gating systems have been evolved to make these metal conditions possible. Perhaps the most familiar of these is the so-called pipe gate where individual gates are cut across from the down sprue like the rungs of a ladder, each intended to introduce metal into the casting when the metal level reaches its height. Sometimes these separate entry gates are supplied with individual down sprues and pouring basins, or are poured with separate pots or by means of an elaborate system of valves.

There is a much simpler way of achieving the same result, namely, to pour the metal directly into the riser of the casting. Of course such a proposal by Brisbois and Cartwright was greeted with the skeptical thought that such methods were certain to result in destroying part of the mold surface and the fouling of the casting with eroded sand. It was also thought that the inevitable splashing and churning of the metal would result in the formation of excessive amounts of dross which had been avoided by older and more conventional methods. In the case of the normal brasses and bronzes, neither of these fears has been justified. True, it has been necessary to take certain precautions in preparing the mold surface for the shock of the first falling metal, but these precautions have been simple and cheap, and the expected formation of dross by turbulence has not occurred. Prevention of erosion is simply accomplished by placing a flat core at the point where the metal will first strike. A pool of metal is quickly formed and acts to cushion the fall of the rest of the metal, while the expected dross is prevented by the atmosphere within the mold itself.

An analysis has been made of the gas within a mold during pouring, and it has been found to be almost entirely free of oxygen, but high in its content of carbon monoxide and hydrocarbon gases similar to coal gas. These gases are in themselves capable of reducing almost any dross films, with the exception of aluminum, that may be formed during pouring, although they are incapable of reducing heavy dross particles because of lack of time of contact. As a result of these conditions, it has been found possible to successfully cast a cylinder or large bushing by the methods described.

Continuous Feeding Secured

The application of this method of casting to other types of work is largely successful where enough study of the peculiarities of the job can be made to place the risers so as to secure a continuous feed of metal from them until the entire casting is solidified.

Application of the same principle of risering to the high shrinkage alloys is equally successful, always providing that other complications introduced by the presence of aluminum or other heavily drossing metals are not met. Those foundries which have had experience in the casting of deoxidized copper, such as is used in the making of conductivity copper castings, will likely agree that this constitutes a good example of the high shrinkage metals. The behavior of this metal is very similar to that of aluminum bronze or manganese bronze, without the complications introduced by the composition of the two latter alloys. At present Allis Chalmers produces a considerable number of 200 to 500-lb. copper ingots for forging purposes, and it is found that they may be successfully cast in the manner described — that is, by dropping molten metal from a runner box through the riser into the mold cavity.

The application of top pouring methods to commercial castings such as may be met with in the jobbing foundry, necessitate taking certain precautions. It has already been stated that there should be no fear of erosion of the mold surface by falling metal. To a certain extent this is not true. It is necessary, where the flow is to be long continued, or where the height of the mold is greater than a foot or so, to provide a core surface to receive the first shock of the falling metal. In the case of more complicated castings this is easily met by some of the cores within the mold cavity, while the simpler castings may require the use of a flat stock core rammed against the bottom of the pattern during molding. At one time, it was thought that a chill could be used equally well for such service, but it was found that many alloys will burn into a chill when the stream is allowed to fall continuously upon it.

Consider next the types of castings to which these methods have been applied. As already indicated, the first type tried was simple bushings, and when the precautions mentioned were taken, that is of supplying a striking point for the falling metal and further taking pains to see that the mold was set in a vertical position to allow the entering metal to fall without scouring against the sides, excellent castings were obtained. This has become a regular method of making bushings ranging in weight from 20 or 30 lb. to 200 lb. or more. (See Fig. 1.)

Another type of casting commonly made in this fashion is assorted sizes of centrifugal pump impellers. (See Fig. 2.) The bulk of these castings are made in green sand with a very complicated center coring, and with large changes in section between the thin vanes and the heavy central hubs. While these castings were made successfully for years by the use of loop gates attached to their upper circumference, trouble was not infrequently experienced due to the presence of shrinkage porosity in either the upper or the lower side

of the casting, where heavy outer hubs were isolated from adequate feed by the thin vanes. In some of these castings, having exceptionally heavy central hubs, the vanes frequently cracked away from the hub unless excessive pouring temperatures were used, which are undesirable because of the high cleaning costs caused by burning of the sand.

Even those foundries which have not encountered this type of casting are familiar with the same effect which is found near heavy bosses surrounded by thin metal. These will show cracks at their junction with the surrounding lighter section. Normal pouring practice is apt to result in even greater difficulties from such cracking when risers are applied to the heavy section. However, if entering metal is poured through these risers, thus insuring an adequate feed to the troublesome section, cracking can almost always be cured without the use of excessive temperatures and without the resultant cleaning difficulties. That has been found the most practical way to gate the pump impellers under consideration. Occasionally, trouble has been experienced in the manufacture of these castings due to erosion of the green sand molds by metal splashing from the core surfaces. In most cases it was due to soft ramming, as was indicated by the presence of minor swells near the surfaces that were eroded. When the castings are large enough to be made in dry sand, such cutting does not occur. Such castings have been made weighing several thousands of pounds.

The casings in which these impellers run (see Fig. 3) are another very common source of trouble in the foundry as their design is such that they almost invariably have large and rapid section changes at the junction of the flanges with the inlet and outlet passages and at the flanges that serve to connect the two halves of the casing. Furthermore, they commonly have bearing housings and stuffing boxes, cast integrally, that represent large volumes of metal, almost completely isolated from normal feed.

Breakage of Cores

Other complicated cores, particularly in the case of multi-stage pumps have in the past given some concern as to dangers of breakage of the cores and some worry as to the undoubted breaking up and splashing of the metal stream entering the mold. Such worry has proved to be unfounded. Many of these casings have been made with a very small percentage of loss due to leakage. In the past, the practice at Allis Chalmers was to make these castings in the same manner as other castings of similar types. A gate is used attached to the lowest part of the mold, designed to give quiet entry of the metal into the mold cavity. Also, risers were placed at the upper parts of the mold wherever it was possible to connect them with the heavier portions of the casting. It was found, and this experience has been further verified by other foundries, that this method of casting almost invariably results in numerous leaks through the casting walls at points that cannot be directly fed by risers. Risers are now attached in much the same manner as before, but the use of bottom connected gates is eliminated and a complete change has been made to the use of runner boxes on the cope of the mold, which pour metal directly into the riser opening at a fairly rapid rate. The castings so produced have been much freer from leakage than was previous experience.

FIG. 3—For this casting the use of bottom connected gates is eliminated and a complete change has been made to the use of runner boxes on the cope of the mold which pour metal directly into the riser opening at a fairly rapid rate.

As to size range, this method is being used on dry sand molds for casings ranging in weight from 50 or 60 lb. to 7000 or 8000 lb. As would be expected in a casting of this type, the falling metal must strike several points on the core surface before it can begin to accumulate in the bottom of the casting, and it would not seen unreasonable to believe that cutting-in would be found at those points. This has not been found to be the case, however, even in some of the largest molds, where thousands of

FIG. 4—Core box and runner cores which are used to reduce the cost in order to make foundry application of top pouring methods practicable.

pounds of metal fall at a single point before the rising level in the casting has provided a cushion.

While no unsurmountable difficulties have been found in the application of top pouring methods to normal foundry practice, the writer realizes that the cost of cutting elaborate runner boxes in the upper surface of the mold may cause hesitation in their adoption. The cost is high for small castings as compared to normal gating practice, and it has been necessary to devise some means of reducing this cost in order to make foundry application of the method practicable.

The solution at Allis Chalmers has been the construction of three sizes of core boxes from which are made stock cores that contain a complete pouring basin and runner box, except for the holes necessary to drop the metal into the mold. (See Fig. 4.) These holes are cut by the core maker while the core is still green, and allow enough flexibility so that the runner boxes will fit castings ranging in size from the smallest to those having riser spacings of 14 in. Where castings are too large to permit the use of these prefabricated runner boxes, the runner box would normally be built on top of the mold in any case. It has become the duty of the core maker preparing the cores for any job to provide one of these runner boxes that will fit the riser spacing of the job being made and will allow metal to drop freely to the lowest point practicable in the mold.

It has not proved necessary to make a new runner box core for each casting. It has been found that these cores when made in reasonably hard sand will stand up for from six to eight castings before they must be discarded. It is only necessary that they be reblackened and dried after each use, and that the metal be carefully emptied from the box at the end of each pouring. It has not been the practice to attach these boxes securely to the top of the mold. They are, instead, set loosely over the risers and are poured only until the risers are full as indicated by a small flow-off, cut either into the side of the mold or the side of the riser. The runner boxes are then allowed to drain, and any remaining metal in the pouring basin is removed by tipping the runner core.

Others, when making castings by this method, have frequently used strainer cores to control the flow of metal into the mold. No use of this practice has been made in the Allis Chalmers foundry as it is believed that such cores, because of their small section, introduce a possible source of dirt or sand, particularly in the case of large castings where large volumes of metal flow through the core. Erosion of a strainer core would seem more likely than cutting of the cores within the casting, particularly when it is considered that the strainer core must carry the weight of the column of metal above it, while the internal core carries only the buoyancy of its own displacement. It has been the practice to so proportion the core sand runner boxes, or the green sand runner boxes for larger castings, that the amount of metal supplied by the pouring basin is more than adequate to keep the down gates filled. Where small core sand runner boxes are not adequate, the practice is to use green sand boxes with down gates made by cutting holes of the proper size through flat stock cores which also serve as bottoms for the extremities of the runner box.

Another desirable factor in the use of top pouring methods is the change found in proper pouring temperatures. Experience indicates that the common brass foundry alloys can be poured at considerably lower temperatures than is the case where conventional gating methods are used. Perhaps the writer should mention at this point that temperature measurements on actual castings gated by conventional methods show that the temperature of the risers may be as much as 200 deg. less than the temperature of the metal being poured into the gates. It is obvious that top pouring methods will reverse this temperature factor and that the risers will be proportionally hotter, making it possible to reduce the pouring temperature of the casting as a whole. It has been found in many cases that this temperature can be reduced by as much as 100 deg. with consequent reduction in the burning-in of the sand. This, of course, makes for lowered cleaning costs and better appearing castings. Where pouring temperatures are maintained at the same levels used in castings gated by conventional methods, some disappointment is apt to be experienced because of the greatly increased crystal size. This is, however, not caused by any defect of the pouring method, but is a result of the metal within the casting actually being at a much higher temperature than when conventional methods were used. If pouring temperatures are properly adjusted this coarse crystalline appearance will be avoided.

It is unfortunate that top pouring methods are so often surrounded with an air of newness or mystery when in fact certain modifications of them are familiar to every foundryman. Those foundries which have cast aluminum bronze or manganese bronze have certainly used methods closely allied in principal to those under discussion. It is believed that the most

successful gate for general application to either of these two alloys has been that used in simple castings where the gate itself enters directly into the bottom of a riser. Here it is found that when the casting has been filled with metal from the gate, the last metal flows directly into the riser and supplies a high temperature source of feed.

This can best be illustrated by methods that are suitable for the casting of simple stick castings. Suppose that the desire is to make castings several inches in diameter by a couple of feet in length. Experience indicates that it is impractical to make such a casting in a vertical position with a gate connected to the bottom and a riser at the top, as such a casting will commonly be porous through the center sections. It is true that such porosity may be fine and may not be serious enough to scrap the casting, but the writer believes that it will invariably be present.

However, if the casting is made in a nearly horizontal position, with a riser connected to one end and a gate leading into the bottom of the riser, so that the riser is the last portion of the mold to be filled, the casting will be found to be sound throughout. It is good practice to raise the end of the casting farthest from the gate about an inch or so in order that the metal filling the mold will remain in a compact form and will not trickle in isolated droplets across the mold surface. It is not, however, necessary to reverse the mold as is commonly done, in order that the feed will be entirely downward. Since the height of the riser is great enough to supply hydrostatic pressure to the farthest end of the casting, be it high or low, the casting can be fed by such a riser if the temperature gradients are such as to permit that feed.

This same principle in gating is also applied in the casting of disks which are made in a horizontal position with a riser in the center and a horn gate opening directly beneath the riser itself, although this in no sense constitutes top pouring. The writer wishes to emphasize that top pouring is used simply because it provides desirable temperature gradients, and because it is one of the simplest methods of casting lay-out. The one justification for the emphasis put on top pouring is the desire to show that the apparent disadvantages in its use are more fancied than real, and to further use it to demonstrate some of the basic principles of sound foundry practice.

It is believed that foundries will find that any satisfactory foundry method, whether it be by placement of risers or gates, or by the use of chills, is dependent simply and solely on providing the necessary progressive freezing of the casting from its most distant points to its ultimate source of feed, and further, that contrary to belief, castings not provided with an adequate source of feed, be it riser or gate, will show some general or localized shrinkage, although it may not be of a serious nature.

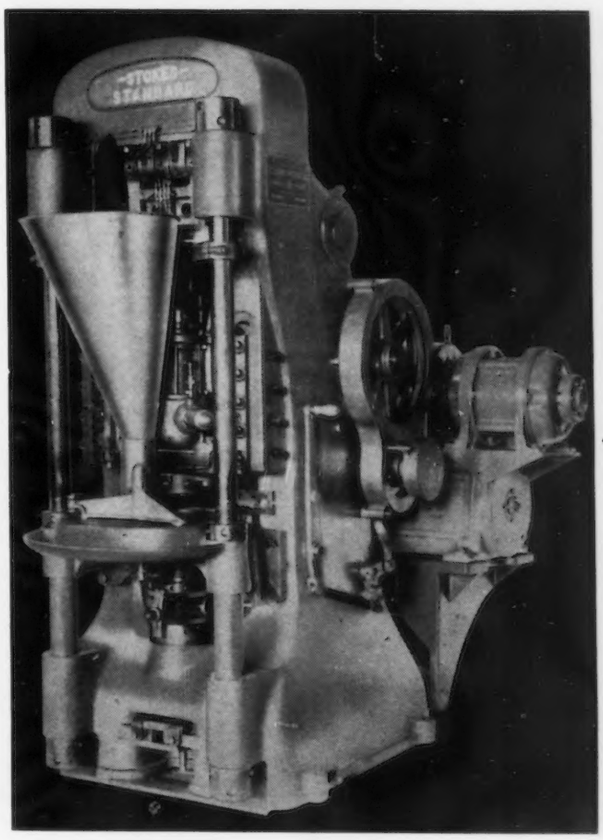
Press for Powder Metallurgy

IN compressing powdered metals it is often necessary to apply a relatively slow, smooth squeeze to the material, rather than a sharp impact, to allow more time for the metal to flow and thus obtain greater hardness and density in the parts produced. It is especially advantageous in the manufacture of iron gears, bushings, valve inserts, etc., to have these parts as dense as possible when they come from the press. To meet these requirements in applying pressures up to 100 tons, the F. J. Stokes Machine Co., Philadelphia, is offering an automatic, self-contained, cam-operated, toggle-type press similar in design to a smaller press of the same type which is being used very successfully in many compressing operations.

This press opens and closes rapidly in the clear, but the toggle action automatically slows down the movement as the punch and die are finally closed. Thus high output is obtained, up to 50 strokes per min., while pressure is applied slowly and smoothly and maximum density is secured. A motor of 7½ or 10 h.p. is used.

The press is of extra rugged construction. Bearings are large, bronze bushed. Toggle pins and cam inserts are of alloy steel, hardened and ground.

The press is fully automatic, has a 2-in. die-fill, produces parts such as iron rings with a maximum of 4-in. diameter and makes 15 to 50 strokes per min. A hydraulic compensating device cushions the shock of compression, aids in setting-up to the desired pressure, assures the application of the same pressure to and uniform density in each piece.

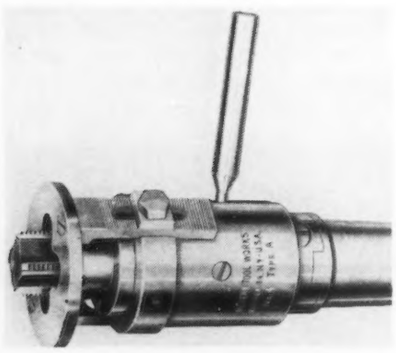


New Equipment . . .

Small Tools, Cutters, Gages

A crop of new developments are here described—taps, cutters, and broaches, clamps and vises, hand tools and coolant pumps, checking and measuring instruments. Some of these tools were presented at the recent ASTE show.

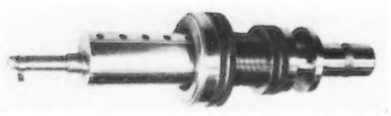
BOTTOM hole tapping with standard chasers is one of the features of the new line of collapsible taps recently announced by *Modern Tools Works,* Rochester, N. Y. This tap is made in one piece with a solid end. No end plate or cap is required and regular chasers extend beyond the tap body for close to bottom tapping. Collapsing



is positive and always at the same point, effected by an adjustable hardened steel trip plate. Chasers in this new tap are set in on an angle and can be removed easily by merely taking out one screw. Provision is made for adjusting tap to cut large or small threads. Stationary type has a handle and rotary type sleeve for resetting. But types can be converted by removing handle and replacing sleeve. There are 12 sizes from 13/16 to 3¼ in. diameter, each size covering a threading range.

Recessing Cutter

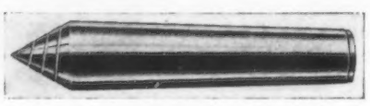
SPECIAL tools for recessing, grooving, undercutting, necking and facing have been developed by *Scully-Jones & Co.,* Chicago. Tools are suitable for automatic



screw machines, turret lathes, drill presses and horizontal boring mills. A ball bearing stop collar strikes against the work, stopping forward movement, while the rear portion continues in motion, feeding the tool bit. Adjustment is provided for the tool bit after regrinding for location of the groove, for correct depth setting in controlling the diameter of the recess and also for length of recess in tools where the bit moves forward after reaching the maximum diameter of its cut. Holes as small as 5/16 in. can be recessed with grooves of varying width and depth.

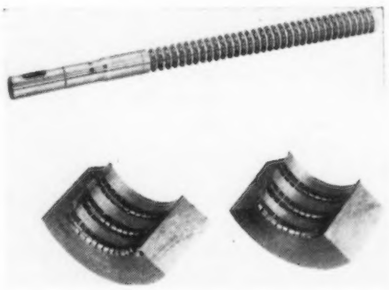
Lathe Center

A LATHE center with left-handed helical grooves is intended for the lubrication of entire surface of work supported by the dead center on tail stock. Grooves hold a supply of lubricant for replenishing the liquid lost due to friction and heat. The grooves further prevent lubricant from dripping or being forced out of work. It is stated that this center compares as 15 to 1 in running time with the conventional type of centers. It can be used both for high speed and slow work and is obtainable in sizes from Nos. 0 to 6 from *Chicago Mfg. & Distributing Co.,* 1928 West 46th Street, Chicago.



Jump and Circular Broaches

RED RING double circular broach was developed for cored or pierced holes in castings and forgings which in broaching require relatively heavy cuts in order to keep the cutting edges of tools below the very hard scale on the inside surface of the hole. It is said that the special arrangement and sizing of teeth make this a very efficient broach to use, and one that can be made 50 per cent shorter



than normal broaching practice would indicate. It is produced by the *National Broach & Machine Co.,* Detroit. This company also produces a Red Ring circular traverse broaching for cutting a circular 0.037 in. slot in one revolution at a production rate of approximately 100 per hr. Accuracy and production speed are claimed to be higher than obtainable in milling or boring operations and the cost is less.

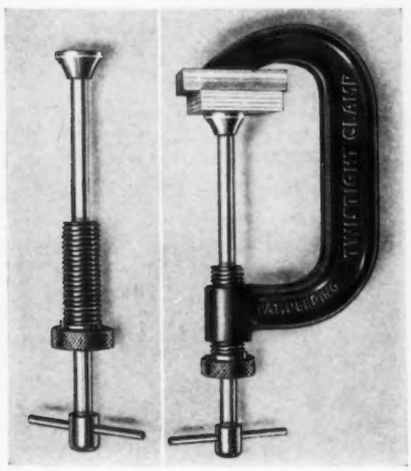
Foot Operated Vise

SUPPLIED in a variety of mountings, the automatic vises shown will find a great many applications in general and repair shops. It is operated entirely by foot. When not locked, the movable jaws slide easily into position by slight pressure of hand or body.

Jaws open 6¼ in. By tightening a screw the tool can be set for repetitive work. The main clamping pedal gives sufficient pressure for general work, but if additional pressure is desired, the small pedal just below the main pedal gives heavier pressures. Two styles are illustrated. These devices are built by *Automatic Vise Sales Co.*, 2845 Sunset Place, Los Angeles.

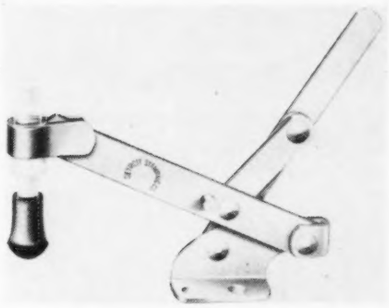
C-Clamp

FOR use in jigs, a new type C-clamp and pressure unit are being offered to the trade under the name of Twistight Push-Pull C-Clamp. The mechanism consists of a rolling clutch inside of a screw barrel which grabs the smooth rod so that the foot of the clamp may be instantly adjusted to any thickness of material to be held. A turn to the left and a pull opens the clamp to its full capacity; a push and turn to the right locks it; and a half to a full turn applies the pressure. The clamp is useful in welding, since sliding rod and swivel foot are made of Everdur metal to which spatter does not adhere. Producer is the *Mechanics Engineering Co.*, Jackson, Mich.



Small Toggle Clamp

LIGHTWEIGHT, small toggle clamp especially suited for aircraft work has been added to the line of clamping tools by the *Detroit Stamping Co.*, 345 Midland Avenue, Detroit. This 6 x 6 x 1 3/16 toggle clamp, known as the De-Sta-Co No. 200 Junior, Special Light Duty, has a clamping ratio of 33 to 1 and is intended for holding parts during welding, drilling, machining, assembly and other aircraft production operations. It is made of cold drawn steel and bright cadmium plated, weighing only 9¼ oz.



Floating Roll Brander

WHERE previous methods needed 6 to 8 hrs., marking of mill rolls has become an operation of some 15 to 30 min., with a new tool in which roll and roll holder are of one-piece construction to eliminate any possibility of thread or screw failures. Type breakage and indistinct branding are eliminated by a floating feature which permits each type to level itself in the roll. The deep background clearance eliminates the chipping of the edges of characters when the branded roll is put in operation. No bearings are needed because of a special shaft design. Setting up is greatly facilitated by this tool which is produced by the *M. E. Cunningham Co.*, 115 East Carson Street, Pittsburgh.

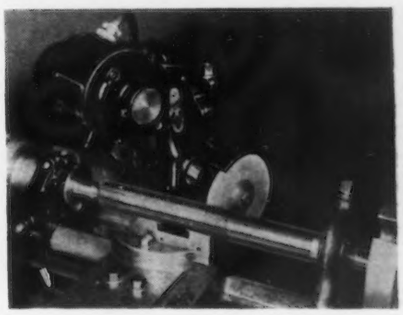
Small Marker

TO enable marking work to be done in lathes, the *Acromark Corp.*, 251 North Broad Street, Elizabeth, N. J., is furnishing a new combination steel roller die and holder to fit in the tool post of standard lathes. This die can be engraved with any numbering lettering or design and, if interchangeable lettering or numbering is to be done, the roll can be made to receive segment style interchangeable steel type. For continuous marking, where the part must completely rotate, for applying graduations to a ring for example, a larger fixture is furnished. Part and die can be synchronized by meshing gears.

Hand Thread Grinder Attachment

FOR use in conjunction with the No. 5 precision lathe, the *Dumore Co.*, Racine, Wis., has brought out an attachment for grinding threads, consisting of a special thread grinder mounting post, a wheel dresser and a thread grinding wheel. This is a portable unit which mounts quickly on any thread cutting lathe. Helical angles are quickly and easily established on both mounting post and dresser attachment. Dressing the wheel is effected by a stroke action lever at a 60-deg. angle. The attachment can also grind Acme threads.

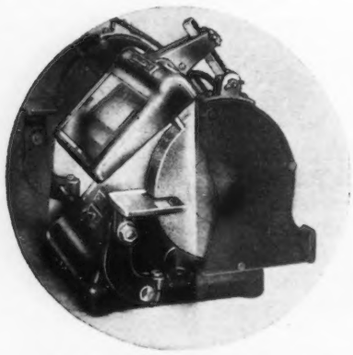
Equipped with a 1/7-hp. d.c. and



a.c. motor, a Dumore No. 18 hand grinder is being produced. This tool has an idling speed of 22,000 r.p.m., weighs 4¼ lb. and has a maximum temperature rise of 16 deg. It is 11 in. long and 3 in. in diameter at the motor. The unit can be supplied with ⅛ or ¼ in. chuck. A spun glass air filter prevents the penetration of foreign particles into the motor.

Shield For Grinders

FITTED with two bayonet type light bulbs, throwing light directly on grinding wheel and work, a new Flud-Lite eye shield for all types of grinders is announced by *Stanley Electric Tool Division*, New Britain, Conn. This design gives 30 per cent more visibility for the operator than previous models, while giving full protection to the



eyes of the operator. The sturdy aluminum finished die-casting cannot be moved to a non-guarding position without dismantling. There are two 4 x 6 in. sheets of glass: safety on top and window glass underneath to be replaced when it becomes pitted by emery dust. The attachment is built to withstand continuous vibration.

New High Speed Hand Tool

A LIGHT weight hand tool which is claimed to have a speed of 35,000 r.p.m. under load is being produced by *Precise Products Corp.*, 715 Racine Street, Racine, Wis. The 1/7-hp. motor is insulated so efficiently that complete safety is attained without a ground connection. The tool is ball-bearing equipped throughout and can be fitted for burring or grinding. Using an ordinary cutter of 1/3 to ½ in. diameter, Ampco bronze of 350 Brinell hardness has been burred successfully, but at surface speeds of 3000 to 4500 ft. per min., the use of a grinding tool becomes a necessity for the working of steel. The tool weighs 2 lb. 2 oz., and will not become more than hand warm, even in extensive use on a production basis, according to the maker.

Using this motor as a basis, it is contemplated to extend the range of the tool to larger cutters through the use of a reduction gear, bringing the spindle speed down to 2000 to 2500 r.p.m.

Coolant Pumps

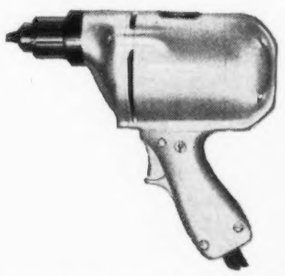
SUITED for supplying coolant to machine tools, for use where the liquid may be polluted by dirt or abrasives, for a large volume of flow at a low head and for light transfer work are the new motor driven centrifugal pumps Nos. 225 and 245 made by *Brown & Sharpe Mfg. Co.*, Providence. These pumps are of compact design, motor and pump unit being closely coupled. Discharge port can be located at

any 90 deg. position with respect to motor by shifting pump assembly or motor end bell. Pumps are designed for operation with the impeller below the liquid level. Radial discharge permits uniform piping and direct flow of liquid. A mechanical seal prevents leakage of liquid and totally enclosed motors are safe from dust and solids. A ½-hp. motor can discharge 55 gals. of coolant at 10 ft. total head and 20 gal. per min. at 22½ ft. head. While No. 225 is fitted with a foot type bracket, No. 245 has a flange mounting integral with the pump.

Another recently developed B. & S. pump is the 206A motor driven centrifugal pump. The small diameter base makes it suitable for installation in small, narrow tanks or in other places where the space is limited. Submergence is 9 15/16 in. Pump is equipped with stainless steel shaft, grease sealed ball bearings and is hydraulically balanced. The ¼-hp. motor is totally enclosed and runs at 1725 r.p.m.

Hand Drill

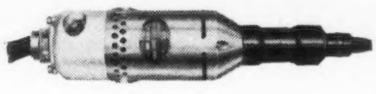
A PRACTICAL, production drill with high power, compactness and light weight is announced



by *Black & Decker Mfg. Co.*, Towson, Md. This ¼-in. standard drill is equipped with anti-friction bearings throughout, splined gear mounting, locked inner and outer races on spindle bearing, and removable commutator end cover. With close offset and choice of end or side handle, this drill is particularly adapted to aircraft work, with a full range of spindle speeds to meet aircraft production requirements. Drilling capacity in steel is ¼ in., in hardwood ½ in. The standard speed is 2000 r.p.m. and is available also in 3500 and 5000 r.p.m.

Motorized Screw Driver

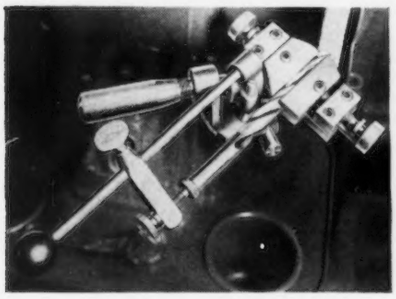
WOOD screws up to No. 10 x 2 in., self-tapping screws up to No. 12 and machine screws and nuts up to ¼ in. diameter can be driven by a new tool developed by the *Van Dorn Electric Tool Co.*, Towson, Md. This center-drive



Scrugun is well suited for operation in a suspended position. Center spindle improves aim, the bonnet grip or paddle switch arrangement eliminates handles, and it will operate in reverse at full power when equipped with reversing switch. It is available with positive or adjustable clutch, and with either bonnet grip and toggle switch or paddle switch. No-load speed is 750 r.p.m., but other speeds available are 500, 1000 and 1250 r.p.m.

Drill Grinding Attachment

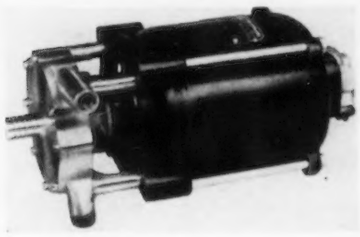
PRECISION built drill grinding attachment which uses the face of the wheel simplifies drill sharpening considerably. A setting arrangement with an accurate scale permits micrometer settings that insure evenly ground lips so that the drills run true. The amount of lip clearance on the drill is just right with part of the heel cut away to provide enough clearance without weakening the cutting edge. The attachment can be ad-



justed to provide the lip clearance and angle required for the job. It is made for a range of drills from 1/8 to 5/8 in. diameter by *Delta Mfg. Co.*, 600 E. Vienna Avenue, Milwaukee.

Midget Explosion Proof Pump

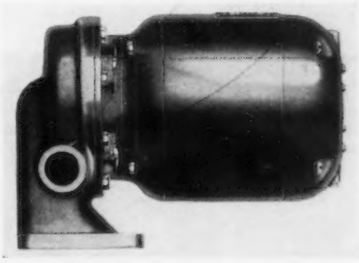
MODEL D explosion proof pump is a recent addition to the midget line of pumps of the *Eastern Engineering Co.*, 45 Fox Street, New Haven, Conn. This centrifugal unit, measuring 10 x 5½ x 5 in., bears the Underwriters Class I Group D label of approval,



is compact in size and designed for continuous duty operation. The pump can be used in all industrial, pilot plant, laboratory and experimental applications where an explosion proof unit is necessary. The 110 or 220 volt, 1/12-hp. motor yields a maximum capacity of 5.7 gal. per min. and pressure of 16 lb. per sq. in. The pump comes fitted in a variety of materials and threaded for ¼ in. standard pipe fittings.

Low Level Coolant Pump

COMPACT coolant pump, model VBA, has just been announced by *Pioneer Engineering & Mfg. Co.*, Detroit. This unit makes possible the placement of a coolant



pump under conditions beyond the range of other models. It will function efficiently with an extremely low water level, particularly in shallow places—out of reach of most pumps. Positive prime is assured even with the reduced height of coolant in the supply tank. This model can readily be taken apart and serviced. Motors have been modernized by streamlining. This design is now carried throughout the line of Pioneer pumps.

Heavy Duty Hydraulic Pumps

IMPROVED motor pumps are available with both single and double end motors made by *Vickers,*

Inc., Detroit, with single or multiple pump mountings in sizes ranging from ¾ to 150 hp. The only mounting provision required is for the motor feet. Installation is greatly simplified and the space requirement reduced to a minimum. These ball bearing motor pumps are available in open, splash-proof, totally enclosed and explosion-proof models.

Also new are a line of Vickers solenoid operated valves which are protected by rugged aluminum covers, improving the appearance. By the removal of two cap screws the cover can be removed to provide for inspection without disturbing the wiring. On valves with two solenoids, a connection joins the two parts. Only one outside conduit connection need be used. Types cover standard and flange pipe connection and the gasket mounted design. Sizes are from ¼ to 3 in. pipe sizes.

Vickers has also brought out new designs of rotary piston type variable displacement fluid pumps and motors, as well as several new control panels.

Impressor

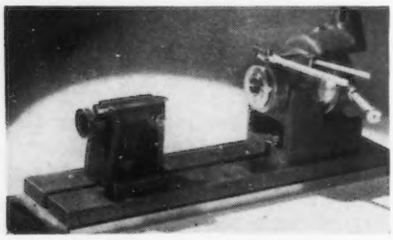
ACCURATE hardness tester for aluminum alloys and softer metals, plastics, hard rubber, etc., is produced by *Barber-Colman Co.*, Rockford, Ill. This small light weight impressor can be carried in the pocket. A slight pressure

against the surface to be tested gives an instantaneous, direct reading on the plainly visible dial. The impressor may be used in any position, vertically, horizontally and inverted, making it possible to check the hardness of vital parts after fabrication and installation. The impressor can prevent costly and dangerous errors by detecting the accidental use of materials which are identical except for hardness.

Collet Index Fixtures

FOR use on grinders, milling machines, shapers and drill presses to replace holding devices for each

different application, collet index fixtures have been developed by the *Hardinge Brothers, Inc.*, Elmira, N. Y. There is a horizontal and a horizontal-vertical model. Spindle takes 1 in. capacity collets and has a hardened and ground index plate



with 24 holes giving from 4 to 24 divisions or 15 deg. spacings. Index pin is spring backed for quick location in the index holes. The horizontal-vertical model has in addition an index plate preselecting arrangement, a collet closer with a 100 to 1 leverage to facilitate chucking of work, ratchet device for rotating spindle rapidly when indexing, and a base for either horizontal or vertical operation.

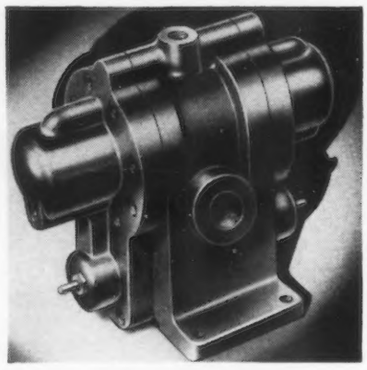
New Dial Snap Gage

WHERE close tolerances have to be maintained to the order of some 0.0001 in. or more, refined gaging becomes highly desirable. Closest limits can be checked with the new Standard dial snap gage in

which the pressure applied remains constant and measurements are invariably repeated. The newly designed indicator, graduated in 0.0001 or 0.001 in., in 0.01 or 0.005 mm., is built into the frame of the gage and convenient to read. The indicator is completely protected against excessive impacts by a shockproof internal mechanism. The gaging faces are tipped with tungsten carbide beveled on the front edge. Zero setting is effected with gage blocks and locked by the AGD standard lock for snap gages. Each gage has a 9/16-in. range and eight sizes cover all dimensions up to 4 1/16 in., with 1/16 in. overlap. This instrument is produced by the *Standard Gage Co., Inc.*, Poughkeepsie, N. Y.

Hydraulic Pressure Booster

PRESSURES from a low pressure pump can be converted into high pressure in ratios ranging from 2 to 1 to 7 to 1 by the action of a booster produced by the *Racine Tool & Machine Co.*, Racine, Wis. It replaces a high pressure pump, permitting the use of a lower horsepower motor. The



booster is a self-contained unit of compact leak-proof construction and is of particular value in plants specializing in coining, molding, punching, shearing and other operations requiring high pressure actuating power. The increased pressure ratio 1:7 means in practice that a 430-lb. pressure will be raised to 3000 lb., with a 3.4 gal. delivery obtained from a 24-gal. input. Boosters providing a total of six ratios are available and units for higher pressure or greater volume will be built on request.

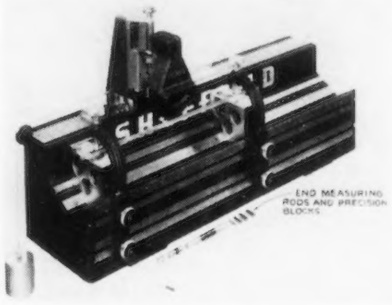
To Measure Rifling

RECENTLY the *Federal Products Corp.*, 1144 Eddy Street, Providence, designed a rifle and gun gage for checking "lands" and "grooves" of gun barrels of small pistols and rifles up to heavy artillery guns. This model G3F P-28 gage is shown inserted in a 37-mm. anti-aircraft gun. The head of the gage consists of three sensitive contact and three guide points. The entire head revolves so that the guide points will rotate the head as the gage is inserted down the gun barrel. This allows the contact points to follow the grooves for diameter, out-of-roundness and taper. Lands can be checked in the same way. Guides prevent contact points from slipping. The barrel of the gage is graduated in inches. Contact points can be contracted by a trigger beneath the dial indicator.

This firm also produces dial indicator gages of a type similar to the one described above, but readings are down to 0.00005 in. and by interpolation to 0.000025 in. Furthermore a mechanical gage of the plug type is produced for which outstanding accuracy is claimed.

Thread Lead Checking Instrument

SPEED and accuracy in checking screw leads or rack teeth are features of a new instrument of the *Sheffield Gage Corp.*, Dayton, Ohio. This instrument is built in portable and bench models and uses gage blocks for reference. A visual



gage head is used which includes a frictionless and positive reed mechanism and any desired magnification. Twelve in. can be checked at one setting.

This company also produces new visual gages for checking master gages or parts. They are built with five magnifications from 10,000 to 1 down to 500 to 1.

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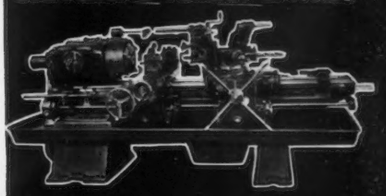
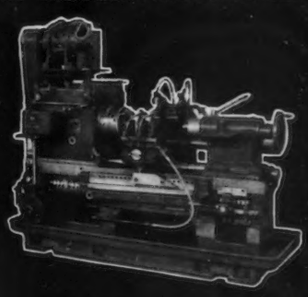
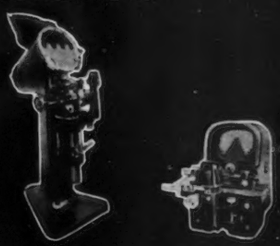


FAY AUTOMATIC LATHES



OPTICAL COMPARATORS



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On The Assembly Line

BY W. F. SHERMAN
Detroit Editor

• History of development of Allison airplane engine shows difficulty of the job of designing and adapting power plant to all types of planes . . . New alinements of engine and airplane manufacturing units predicted . . . Automobile assemblies jump to above 130,000.

DETROIT—The history of the development of the Allison high-output aircraft engine was put on record here last week when R. M. Hazen, vice-president and chief engineer of Allison Engineering division of General Motors Corp. presented a lengthy paper on the subject before the Society of Automotive Engineers.

The Allision, only liquid-cooled military airplane engine available in the United States, is a most important component of the air weapons of the U. S. Army, so the history of its development is of widespread interest, even though Mr. Hazen made no attempt to answer any of the taboo questions such as those dealing with current production rates, or up-to-the-minute performance figures—and even though he stopped short of getting in the prevailing argument about the respective merits of liquid-cooled engines and air-cooled engines.

Hazen's remarks served the following worthwhile purposes:

1. Gave engineers a most complete diagram of the labrynthian paths through which designers, experimental workers and production men must toil before they can produce any acceptable airplane engine in the higher power brackets.

2. Outlined the series of design changes on the Allison engine during its development, thereby demonstrating the major trends in aircraft engines in the past 10 years, and for the immediate future.

3. Revealed discoveries made by Allison which hint at important structural changes which may be expected in such engines in the near future.

4. Helped to forecast certain important changes in airplanes themselves.

5. Revealed problems of adapting an "accepted" engine to a variety of different airplanes, as is required when an independent engine supplier competes against other engine suppliers to have his product installed in independently built airplanes.

6. By deduction indicated the probable future alinement of engine manufacturers and plane builders.

Not An Easy Task

Although probably not calculated to frighten anyone else away from attempts to produce high output engines for the airplane industry, Mr. Hazen's remarks certainly did not make the job sound like an easy, inviting one.

As far back as 1930, airplane engine output was 0.25 to 0.35 hp. per cu. in. of displacement but the Schneider Cup racing planes of that period developed approximately four times as much horsepower from the same size engines. Significantly, no cup racer engine ever became available for production. This, Hazen said, was probably attributable mainly to the fact that the "balance of design" required in racing engines for extremely high performance for short periods is not at all comparable to the balance of design required in a production engine. Allison's important task was to find the right balance of design for a production engine of the high-output type. While it was at this task, normal output climbed until, in 1939, it was about ½ hp. per cu. in. displacement; now demand has reached a peak of 2/3 to ¾ hp. per cu. in. for take-off purposes in military aircraft.

Since Allison (then a manufacturer of precision bearings) started late in 1930 on its initial work on the V-type, high-output engine, the power plant has been stepped up from 650 hp. without supercharging to 1000-1150 hp. in its present supercharged state, and has also grown in weight from around 1000 lb. to about 1320 lb.

The engine originally envisioned was a completely reversible power plant to meet the requirements of dirigible installation. (Allison's interest in this was connected with its design and manufacture of extension shafts and movable bevel gear joints for airships like the *Akron* and *Macon*.) This original engine was designed to come to a full stop, reverse and then reach full power in the opposite direction in 8 sec. A mechanical arrangement was provided to change the timing and reverse the direction of starter rotation while the engine was stopped.

Frequent Variations in Design

About this time the *Akron* and *Macon* were destroyed, GM purchased Allison, and interest in the engine began to center largely on its possibilities for use by the Air Corps as a supercharged engine for airplanes. For more than five years the engine went through repeated redesigning to improve performance or eliminate dangerous vibration. It finally passed acceptance tests in 1937, seven years after the design was started. It became available then as the first 1000-hp. engine of its type.

When finally considered an acceptable engine, an aircraft power plant has just started on its course to actual use, Hazen revealed. For each airplane type, for each airplane manufacturer, and for each model of every plane, some variation in design was necessary. Among the first 20 engines built there were 14 different models, each involving costly engineering and ex-

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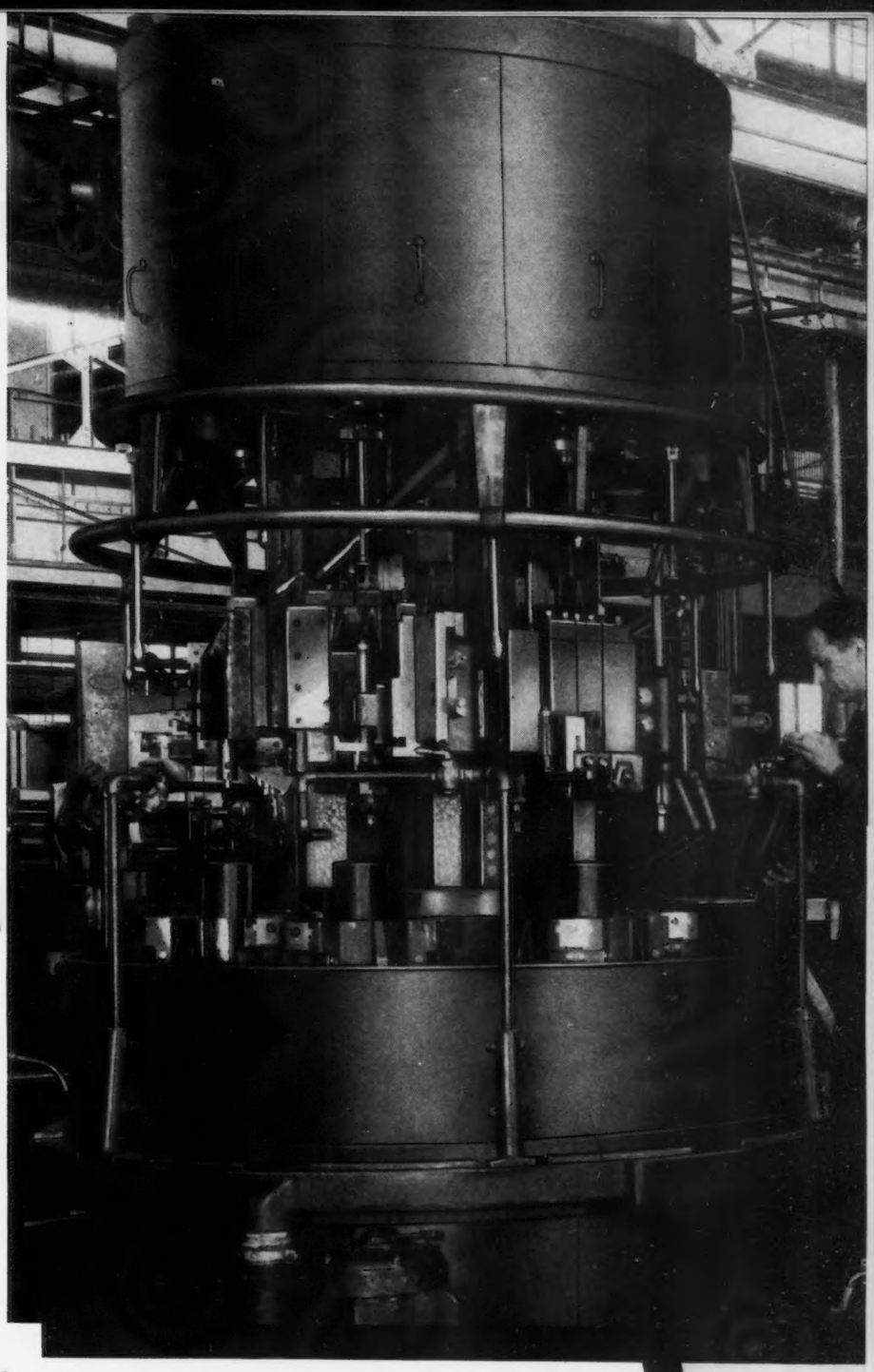

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perimental work. Of the 14 different models built experimentally, only one finally went into production. And, in an order for 40 of these engines, 20 were specified for right-hand rotation, 20 for left-hand rotation.

When production on a large scale was contemplated in the spring of 1939, it was a problem to justify erection of a plant capable of turning out 300 engines a year. Today, in contrast, an output of 300 engines a month is considered far short of the quota.

The engine structural changes which were indicated as probabilities for the future center around the problem of building an engine "stiff" enough to perform satisfactorily in the high speed airplanes of today. Hazen pointed out that cylinder head cracks were found in earlier models which were designed only for the explosion loads of each cylinder. He said that the cracks showed clearly that there had been bending of the whole engine due to inertia forces acting on the plane's engine in the air. He predicted that "en bloc" cylinder construction would probably prove lighter and stiffer than construction which makes use of individual cylinders, as is typical in all present-day airplane engines.

The forecast of airplane design changes hinged largely on a discussion of the desirability of engines capable of rotating in either direction. On twin-engine airplanes it has been found desirable to install engines which rotate in opposite directions, so that torque effect of one engine is offset by having its mating engine revolve in the other direction. This has been accomplished in the Allison by a design which requires only relatively minor changes in final machining of the crankcase and main bearing, plus installation of the camshaft in an end-for-end position, and changes in the accessory housing.

Hazen mentioned also the current interest in dual rotation propellers. Among aircraft designers it is already widely acknowledged that such propellers, using two opposite rotating sets of blades on a single propeller axis, are the next step to permit use of higher output power units.

If there is a moral to the Allison story, it is this: that the supplier of an airplane engine intended for general use in a number of types of aircraft must face, after the basic engine is developed, a long period of expensive cut-and-try to adapt the engine to various airplanes. The only way to speed the process and obtain more ready acceptance is through closer coordination in the design of the airplane and its engine. Thus the combines which have both engine manufacturing plants and plane fabricating units, are in the most favorable position in this respect. The rumored Ford plan to produce (eventually) a Ford-designed engine and plane together looks like the least costly and speediest procedure.

GUN ARSENAL MANAGER: F. J. Morisette, whose career includes experience with important machine tool companies and as an automobile production man, has been named operating manager of the new Chrysler gun arsenal.

Photo by Harris & Ewing

NEW LINE: America's oldest automobile manufacturing plant (Studebaker) goes into the aircraft engine business, and a workman hangs a new sign at Studebaker's aviation division in South Bend, Ind. The company in building aircraft engine plants at Chicago, Fort Wayne, Ind., and South Bend.

This has its parallels in the automobile industry which for years bought standard engines, like the Continental Red Seal engines, for instance, but finally found it necessary to coordinate the design of power plant and chassis, and then produced them in one factory under unified engineering and production control.

The history of the airplane industry, as well as current developments, indicate that there will be just such new alinements of engine and plane manufacturing units. Of course, there already exist in the aviation industry a number of combinations in which airplane manufacturers are affiliated with engine builders. Allison, itself, is an example of this sort of thing because General Motors Corp., the parent concern, exercises important stock control over North American Aviation and in the defense program General Motors (Fisher Body) has assumed the responsibility for building sub-assemblies for the North American bomber.

Chrysler appears to be on the verge of doing something similar in that it is going to build subassemblies for the Martin bomber and is engaged in experimental work on a 2000 hp. aviation engine, according to K. T. Keller, president. The Stout Skyscraft Co., which is expected to build 100 small stainless steel planes for liaison work in the Army, is also engaged in the development of a power plant for this type of aircraft.

Automobile production has rebounded to the high levels of early March and is again making strides toward a record spring output. Assemblies in the week just past totaled 130,610 passenger cars and trucks, compared with 108,165 in the previous week and 99,305 in the corresponding week of last year, according to Ward's Reports, Inc.

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Washington

BY L. W. MOFFETT
Washington Editor

• Renewal of propaganda for large increase in steel-making capacity seen timed with new Gano Dunn report . . . U. S. now has more ingot capacity than Axis powers plus subjugated countries.

WASHINGTON — Intensification at this time of propaganda urging a large expansion in steelmaking capacity is not a coincidence. Renewal of the high pressure campaign clearly is timed to the progress report on steel capacity about to be made to the President by Gano Dunn, senior consultant of OPM's Production Division. Effort is being made to influence conclusions in the report. It is desired that Mr. Dunn reverse himself and recommend a broad increase of steelmaking. Or, if this attempt is unsuccessful it can well be believed that the drive is designed to influence the President who warmly approved Mr. Dunn's early March report and said he regarded it as the last word on the subject of steel capacity. Only last week OPM Director General William S. Knudsen said he saw no need for construction of additional steel works under the defense program.

Manifestly having in mind that changing conditions might justify certain revisions, the President asked Mr. Dunn to keep figures up to date and report back to the White House at three-month intervals. There have been many developments in the industry since the original report was submitted. The outstanding development most decidedly affects steel production, as distinguished from steelmaking capacity.

Problem Was Idle Capacity

Ample capacity existed. The problem was one of idle capacity. It was idle because of the coal strike. Unless in the future the labor situation is solved more summarily and expeditiously than it was in this instance it makes no difference what the capacity is. It could be 100,000,000 or 200,000,000 tons for the loss of tonnage would be just as evident as though the capacity did not exist. Already the loss is irreparable. Schedules are upset, fuel, scrap and pig iron stocks are depleted, heavy backlogs have piled up, defense requirements have increased tremendously, commercial business has been displaced, probably for the duration of the emergency and rationing of steel is becoming more widespread, while in the meantime pressure for steel that exists for shipbuilding and other defense purposes now promises to be further heightened by large railroad requirements. Coke oven and some furnaces are just getting back into operation. Because of the duration of the strike blast furnace operators, making the most of a bad case, have blown out stacks and proceeded with maintenance and repair work that otherwise could have been deferred. Just what the loss of steel tonnage will be can be known only through company - by - company analysis. But the loss will run into hundreds of thousands of tons.

Are the expansionists to charge the steel industry, an innocent bystander, with the loss and use it as a further talking point for expansion? They may. But to do so will be absurd. On that basis they could cry for unlimited expansion. Just permit a few more strikes, whether in coal or in the steel industry itself and there would be an unbridgeable gap between production (not capacity) and demand. Some of the expansionists are making the contention that the Dunn report did not consider the requirements under the lend-lease bill. Therefore they maintain that whatever the adequacy of capacity at the time of the report that situation has been subsequently changed, making more expansion necessary.

The fact is that before the coal strike—and subsequent to the passage of the lend-lease legislation—the steel industry was more than meeting British requirements. Actually some British orders had been suspended, while 400,000 tons of steel were piled at docks and mills. This was due partly to the fact that Britain was not in urgent need of the steel and also to a lack of shipping space which was needed for more pressing demands. So the lend-lease argument is not tenable.

U. S. Has More Steel Capacity

It's water over the dam but the fundamental difficulty is that Germany was allowed to get a big start on its enemies and consequently was prepared to prosecute its conquest while attacked nations were weak and helpless.

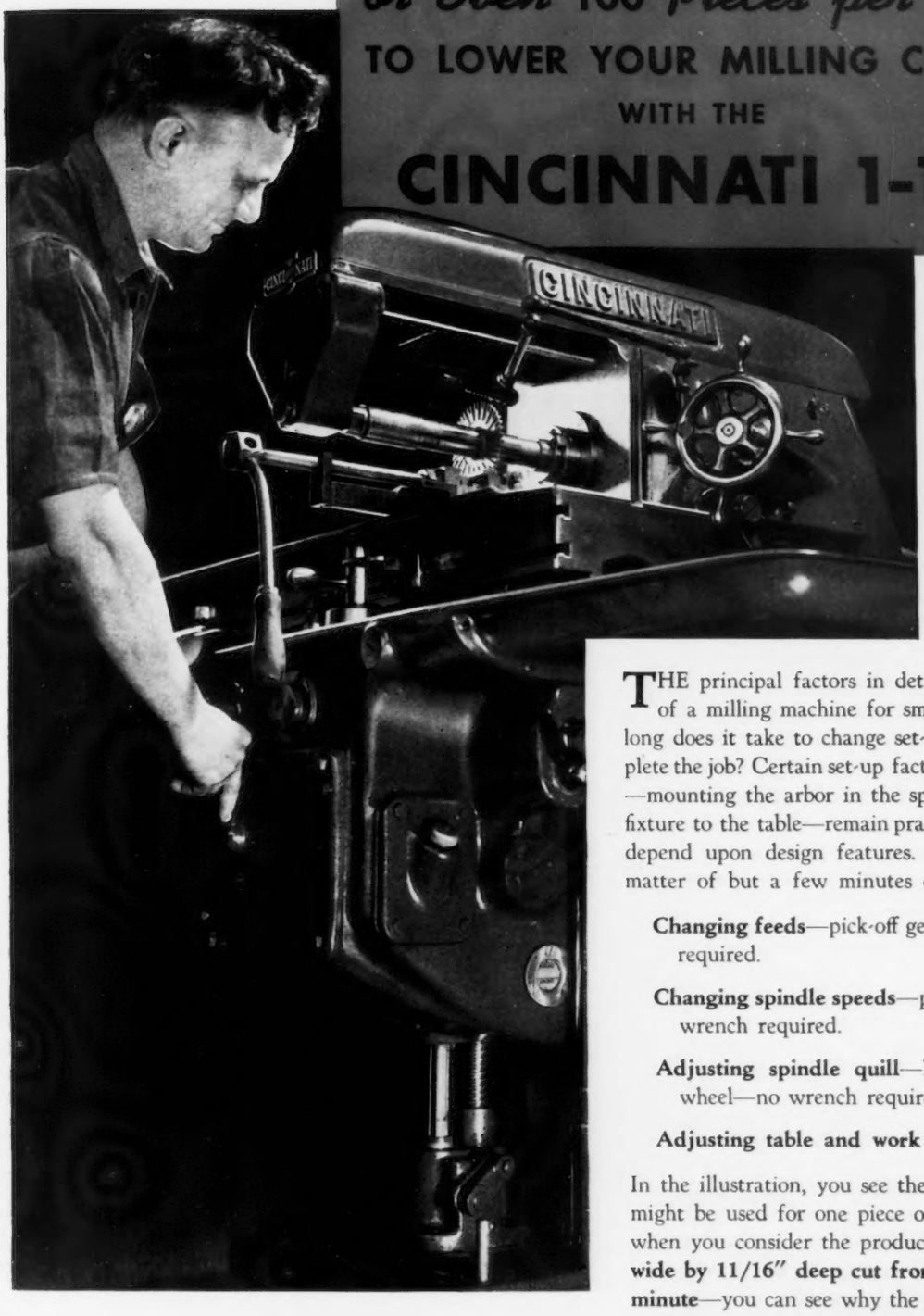
The best answer is not to waste time, labor, management and material by a broad scale program of steel expansion but to use to the best possible advantage that existing and under construction, whatever sacrifice it may mean for civilian purposes. Never was it more true than now that time will be the deciding factor.

The United States alone has much more steelmaking capacity than the combined capacity of the Berlin-Tokyo-Rome axis, and subjugated countries. The United States capacity is currently about 87,000,000 net tons of ingots. Adding British capacity of 16,000,000 tons the two countries have a capacity of 103,000,000 against approximately 61,500,000 tons for Germany, Japan, Italy and conquered countries. This latter figure is broken down in tons as follows: Germany, 30,000,000; France and Luxemburg, 12,000,000; Belgium, 4,500,000; Poland, 1,500,000; Austria, 1,500,-

You Don't Need 1000 . . . . *or Even* 100 *Pieces per Lot*

TO LOWER YOUR MILLING COSTS WITH THE

CINCINNATI 1-12



THE principal factors in determining the suitability of a milling machine for small lots are these: How long does it take to change set-ups! How long to complete the job? Certain set-up factors for a given machine —mounting the arbor in the spindle and clamping the fixture to the table—remain practically constant. Others depend upon design features. Those that vary are a matter of but a few minutes on the 1-12:

Changing feeds—pick-off gears—no wrench required.

Changing spindle speeds—pick-off gears—no wrench required.

Adjusting spindle quill—lever clamp and hand-wheel—no wrench required.

Adjusting table and work to cutter—hand crank.

In the illustration, you see the kind of a set-up which might be used for one piece or a million pieces. And when you consider the production data—**a slot 9/32" wide by 11/16" deep cut from the solid at 5¾" per minute**—you can see why the 1-12 is profitable for the small lots as well as the large ones. Circular M-848 illustrates and describes the CINCINNATI 1-12 Miller. Write for your copy today.

CINCINNATI

THE CINCINNATI MILLING MACHINE CO. CINCINNATI, OHIO, U.S.A.

TOOL ROOM AND MANUFACTURING MILLING MACHINES . . . SURFACE BROACHING MACHINES . . . DIE SINKING MACHINES

000; Czechoslovakia, 2,000,000; Japan, 7,000,000; Italy, 3,000,000.

Industry In U. S. Is Expanding

What the aggressor nations may be doing in the way of increasing capacity is not definitely known. It is doubted if they are doing much if anything in that direction. But in the United States there has been and is being built new capacity, some of it for special steels, a highly important fact since the present war is a war of special steels rather than a tonnage war. Within a year the United States capacity for making carbon and alloy steel will be close to 90,000,000 tons. New electric furnace capacity built aggregates between 2,800,000 and 2,900,000 tons and before the end of the present year it will be increased to about 3,200,000 tons.

Certainly also from a point of raw materials the Axis countries cannot match American and British resources. Germany, as well as her satellites, need such important materials as manganese, chromium, nickel and alloying supplies generally. It is suspected that she has bitten deeply into stocks that were built up the past few years and that they are being only partly replenished by imports of manganese from Russia, chromium from the Balkans, and nickel from the Petsamo mines in northern Scandanavia.

* * *

Weiner to Direct Civilian Allocation for OPACS

Washington

• • • **Joseph L. Weiner has been** named assistant administrator in charge of civilian allocation of the Office of Price Administration and Civilian Supply by Leon Henderson, Administrator. Mr. Weiner has been director of the Public Utilities Division of the Securities and Exchange Commission since June 10, 1939. In his new post Mr. Weiner will have charge of the allocation of the residual supply of scarce materials among competing civilian industries after defense needs are taken care of.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

THE OL' BULL O' TH' WOODS IS LIKE A DUCK IN A DESERT-- THERE'S SO MANY OFFICIALS WITH THIS WAR WORK THAT HE THOUGHT HE'D BETTER DRESS UP AN' LOOK LIKE A SOMEBODY, TOO!
HE'D OF GOT MORE ATTENTION IF HE'D OF PUT ON A PAIR OF OVERALLS -- THESE GUYS CAN'T BE BOTHERED NOW WITH SHOP OWNERS GETTIN' IN TH' WAY!
COPR. 1941 BY NEA SERVICE, INC. T. M. REG. U. S. PAT. OFF.
THE LONESOME LORD
J.R.WILLIAMS 5-16

Plane Parts Plant Contract with Chrysler

Washington

• • • **The Defense Plant Corp.** at the request of the War Department, has authorized the execution of a lease agreement with the Chrysler Corp., Detroit, to provide for building installations, equipment, machinery, and portable tools at a cost of $1,691,200. The plant will be located at Detroit, and will be used for manufacture of parts for military aircraft. Approximately $16,000 of this amount will be used for building installations, $1,495,300 for equipment and machinery, and $179,900 for portable tools.

The Defense Plant Corp. has authorized the execution of a lease agreement with Jack & Heintz, Inc., Cleveland. The cost of the expansion will amount to approximately $1,293,121; $372,200 for land and buildings, and $920,921 for equipment and portable tools. The company will manufacture airplane parts.

* * *

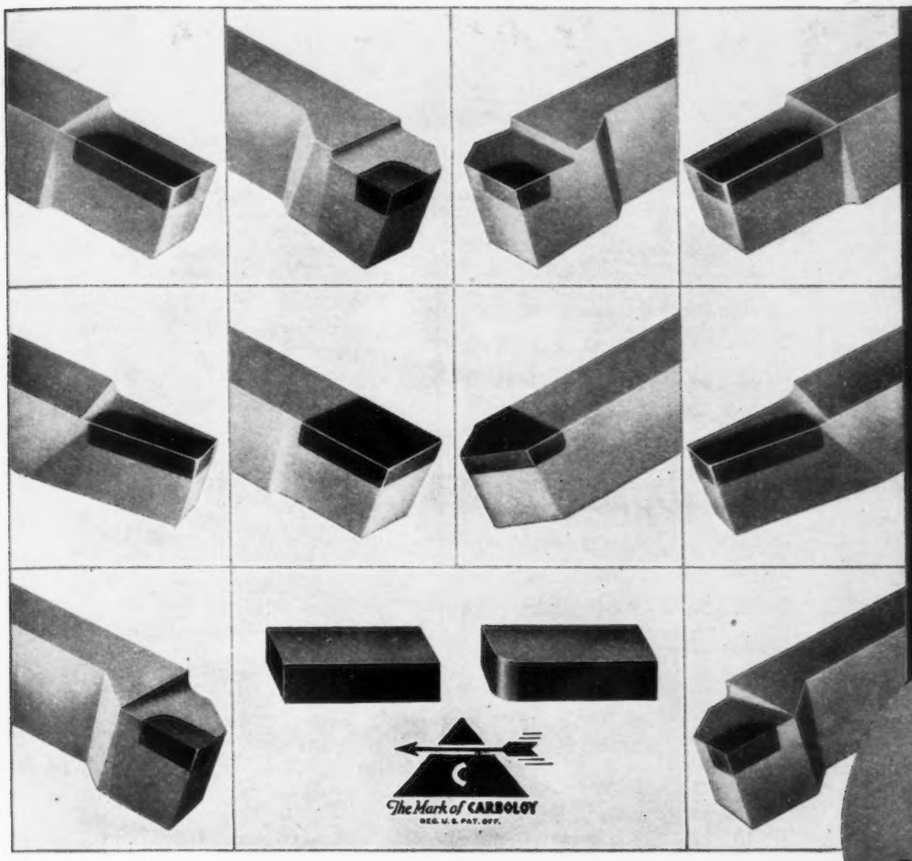
Steel Capacity Ample, OPM Director Knudsen Says

Washington

• • • **William S. Knudsen,** OPM director general, told a press conference last week that he sees no need for the construction of additional steel plants under the defense program. He recalled that the report given the White House several weeks ago by Gano Dunn showed that existing steel facilities are adequate, observing that "so far as I am concerned" the Dunn estimate still stands.

The OPM head said some additional expansion on the Pacific Coast may be justified but he indicated he had no knowledge of the so-called Kaiser plan, under which an annual steel capacity of 1,250,000 tons would be built in Utah, Oregon and California. Mr. Knudsen, however, confirmed reports that construction of additional aircraft plants is being contemplated. He declined to disclose the extent of the new program.

Need *FASTER* Delivery on Carbide Tools?



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FOR 80% OF ALL TURNING, BORING, FACING JOBS

THIS may be *your* answer to the problem of getting carbide tools on the job faster!

The 10 styles of Carboloy Standard Tools and the 2 styles of standard blanks, shown above, represent a standardized line of carbide tools and tips being constantly produced in large quantities and added to stock by Carboloy.

Designed for universal use on 80% of all turning, boring, facing applications on steel, cast iron, aluminum, brass, etc., Carboloy standard tools provide not only faster deliveries but also maximum economy, easy ordering and simplified stocks.

Introduced last Fall—and recently supplemented with 5 *NEW* styles—thousands of Carboloy Standard Tools have been shipped from stock each week for 32 weeks in continuously increasing quantities.

These standard tools may be the answer to *your* carbide tool requirements. Write for revised catalogue GT-129 containing complete prices and specifications.

FOR EMERGENCY TOOLING . . . MAKE YOUR OWN

Order Standard Carboloy Blanks—available for rapid delivery. You mill or grind a recess in your tool shank—and braze in the standard Carboloy blank. Then grind—as easily as you now REGRIND—and the tool is ready for use Complete instructions furnished.

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Look for this triangular trade mark on tools you buy. It is your assurance of genuine Carboloy cemented carbide.

CARBOLOY STANDARD TOOLS & BLANKS

REG. U. S. PAT. OFF.

ON THE WEST COAST

SAN FRANCISCO—While Uncle Sam was fumbling with the lock on export of metals to Japan, he left a great many thoroughbred horses slip out the barn door. During January and February, 1941, these were some of the exports to Nippon through the Los Angeles, San Francisco, Seattle customs districts:

3969 net tons of water, oil, gas, and other storage tanks complete and knocked-down, valued at $2,552,000.

Metal drums for oil and gas valued at $215,504.

74,700 lb. of nickel, monel, metal and alloys, ingots, bars, rods, sheets, plates and scrap. This materail was valued at $19,086.

1338 net tons of scrap copper valued at $192,709. In addition, 4323 net tons of refined copper valued at $948,192 was exported from the Seattle district.

2872 net tons of pig and bar lead valued at $204,364.

5130 net tons of brass and bronze scrap valued at $75,807.

Although iron and steel manufactured articles became subject to export control Dec. 30, 1940, licenses were issued for exports to Japan of $54,275. Still more amazing, iron and steel scrap, which became subject to export control Aug. 1, 1940, went to Japan to the extent of 289 tons of heavy shoveling steel, selected rail, scrap, machine shop tonnage, and wire shorts.

These figures do not include the Portland customs district which doubtless would swell them substantially.

Tanks Possibly Useful at Home

It may be argued that the pound price of storage tanks indicate second-hand material, but it is also true that if these tanks were in good enough condition for use in Japan, they could have at least seen temporary service in this country and taken some of the pressure off plate fabricators who have had extremely heavy inquiries.

• Large metal tonnages shipped to Japan despite export control . . . San Francisco strikers find victory expensive . . . New Coast mill would bring pressure on scrap supply prices . . . Objectives of aeronautical research defined . . . Boeing ups backlog $17,000,000.

Although the Japanese have consistently claimed that they are America's best cotton customer, metal exports to them were worth more than raw cotton taken in each of the first two months of 1941.

Meanwhile, Pacific Coast exporters claim that six weeks or longer are required to obtain export licenses for commodities bound for other Orient destinations. Material is piled high in San Francisco docks and warehouses because of the shortage of bottoms, causing further delay in shipment. Both San Francisco and Los Angeles Chambers of Commerce are in action on the license situation, hoping to have a regional office of export control established on the Pacific Coast. Such an effice was established during the last war. Now all applications for export must be forwarded to Washington.

A regional Coast office would put a finger in the levee on such depletion of American resources as listed above, and would facilitate legitimate exports.

Establishment of a new mill on the Pacific Coast which depended to any extent upon steel scrap for its operations would cause havoc in the scrap market here, and possibly eventually would force a rise in the Government price ceiling. Those who consider the potential scrap supply as an absolute quantity without consideration of assembly cost, estimate that an annual excess of nearly 200,000 tons exists over the needs of present Coast mills operating at capacity. The basis for this figure dates back to 1939 when local mills were operating slightly above 50 per cent of capacity and when 542,092 gross tons was exported from Pacific Coast customs districts. The present capacity operation, this reasoning runs, will not completely absorb the quantity of material which would normally be exported were exports still permitted.

Scrap Shortage May Result

This reasoning is fallacious, because it does not take into account that this export tonnage was purchased at a price above the domestic market. The value of scrap exported during 1939 averaged over $15.50 per gross ton, according to customs records. This price is $1 above the Government ceiling for No. 1 heavy melting steel and $2 above the No. 2 heavy melting steel top, of which approximately 75 per cent of Pacific Coast scrap consists. Thus, the theoretical scrap cushion above present mill requirements is one which flows to market only at prices from $1 to $2 above present prices. Indeed, dealers suggest that instead of a surplus there may even be a shortage of scrap on the Coast —at present prices. They declare that, in setting the price ceiling, the former export price should have been given more weight, for it is from former export supply sources that domestic scrap is being drawn today.

Because most of Pacific Coast scrap comes from old automobiles rather than manufacturing waste, the supply of scrap on the Coast has not increased as much as in some other parts of the country because of heightened industrial activity.

For this part of the country, at least, it is only correct to speak of a scrap surplus only if you take into account the marginal quantity which would flow to market at a

higher price. At present prices, there is no surplus.

Striker "Won" But Lost

A new Mount Everest in union misleadership towered in the San Francisco machinists' strike which closed San Francisco fabricating machine shops and foundries for 21 days. At the end of that time, employers' representatives conceded and added 2½c. an hour in pay to the major classification of workers. The pay dispute was the major point in causing the strike. Upon conclusion of the agreement, Harry Hook, union business agent, triumphantly crowed "The machinists got everything they asked for." If the strikers spent any of their idle time boning up on arithmetic, they would realize that winning their point cost then each $135 in lost pay plus overtime. It will take them over two and a half years of steady work at the increased rate which they "won" before the added pay equals the amount they lost by idleness. Among other costs that are rising nowadays is that of "winning" a strike.

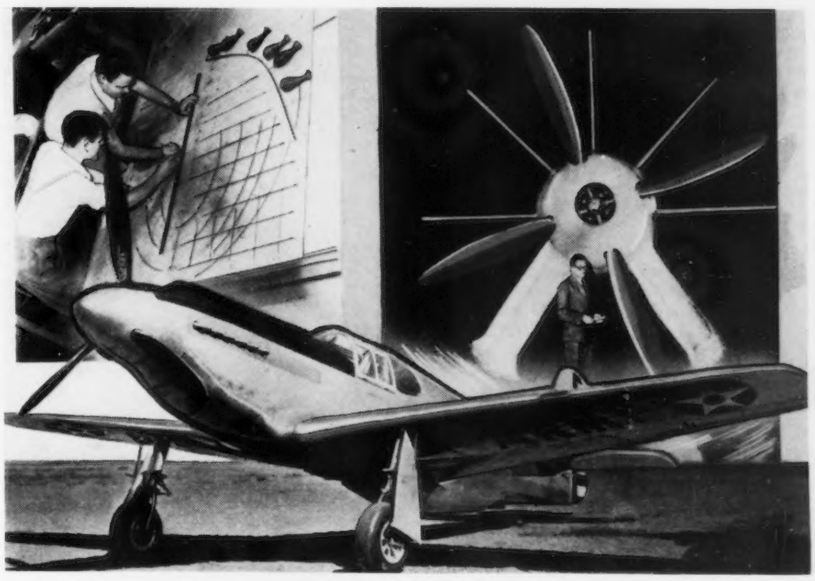
Semi-official definition of the lines along which American aeronautical research engineers are working to attain greater speed, increased rate of climb, higher service ceiling and longer range for military planes was made public last week after a visit to Western aircraft plants by Frank Coldwell, president of the Institute of Aeronautical Sciences and research director for United Aircraft Corp.

Other Steps in Lifting Speed

Mr. Caldwell praised the laminar flow wing, which increases the area of smooth air flow, as the No. 1 development in increased speed. Exemplified in the North American NA-73, the wing moves back the point where the air "breaks away" from the wing surface. This breakaway decreases "lift" and causes air turbulence which increases "drag" or air resistance.

Jet propulsion, which streams exhaust gases from the engine back along the fuselage and wings, is another line of speed research.

In the development of increased power, experimental work is being conducted on engines at least 50 per cent more powerful than present motors of more than 2000 hp. Lockheed's new four-engined landplanes designed for sub-stratosphere flight from New York to Europe in 10 hr., will be propelled by new secret engines more powerful than those used in any military or commercial aircraft. The OPM has given the go-ahead to the Burbank, Cal., plant for the planes which will weigh 43 tons and carry between 50 and 80 passengers. With the exception of the huge Douglas B-19 bomber now undergoing test flights, they will be the largest and most powerful landplanes in the world. Pan American has nine of the giants on order.



FROM CRADLE OF RESEARCH: Against a background of research on the drafting board and in the wind tunnel, which went far towards making its existence possible, you see the United States' latest pursuit airplane, the NA-73, produced by North American Aviation, Inc. That this ship incorporates the new laminar flow wing (a contribution to warplane speed) is due to the ceaseless aeronautical research conducted by the U. S. Government and the American aircraft industry.

40,000 Ft. Ceiling Is Goal

Development of more powerful engines is, of course, an aid to increasing the rate of climb. Research is working toward a 40,000-ft. service ceiling from 7000 to 10,000 ft. more than the present level. Two types of engine superchargers are being developed. One employs engine exhaust gases to drive a turbine which in turn drives a centrifugal compressor which compresses air into the engine. The other utilizes gearing from the engine itself to drive the compressor.

A two-speed propeller drive gear is a present subject for active research, Mr. Caldwell added. This gear shift operates along the same lines as an automobile overdrive. In level flight the propeller turns at a high speed, but, due to the gear, the engine turns at a much lower speed, cutting down fuel consumption.

A new War Department contract for $17,201,352 in planes and parts, awarded last week to Boeing Aircraft Co., Seattle, brings the Boeing backlog to approximately $207,800,000.

Of this backlog, $23,000,000 is for bombers for Great Britain; approximately $10,000,000 for Army training planes being built at the company's Stearman Division at Wichita, Kan., and the balance for Boeing flying fortress of the B-17-E type. The B-17-E bomber is an improvement over the B-17-D, the last of which was completed this month.

Fatigue Cracks

BY A.H.DIX

The Quiet Life

• • • The prolific Dr. Lin Yutang, author of "The Importance of Living," has just purchased, we learn from a Dodge press release, guess what make of car. We also learn that life, according to the gentle Lin Yutang, does not consist of achievement or of making a fortune, but of the homely things—"*a haircut once in two weeks, watering a potted flower, watching a neighbor fall off a roof.*"

Maybe we haven't been around enough, but the last part of the formula strikes us as weak. Nose-diving off roofs may be common in China, but here you could put in the better part of a lifetime futilely waiting for that particular kind of a sadistic belly laugh. The formula should be occidentalized. We suggest, "*. . . or spending a Sunday at a dangerous intersection, watching your neighbors prove that the wheelbase of their new cars can be telescoped from 122 inches to half that.*"

Aptronyms

• • • "*It seems to me,*" muses R. B. (Macklin Co.) Howlett, "*that we will have to be included in your names-that-sound-like-the-job department. We manufacture grinding wheels and two of our salesmen are W. J. Grindall and C. G. Emery.*"

These abrasively-monickered gentlemen are happily placed, but consider the cruel irony that placed in the importing and exporting business, instead of the polishing wheel industry, F. S. Buffum of New York City.

Another of fate's aptronymic miscasts is the chief draftsman of the Hall-Scott Motor Car Co., Berkeley, Calif., but obviously born to be associated with the aircraft industry. The name is J. E. Glidewell.

Honest Toil for the Gentry

> . . . a shop well equipped with transfer cranes, with jibs or gentries to handle and turn the work over . . .
> —*From The Iron Age*

We'll take the jibs. The gentry's hands blister too soon.

"Are You Trying to Wean Us?"

• • • In these days of painfully parceling out supplies to old customers, and acquiring stomach ulcers in the process of trying to keep everybody satisfied, there's a smile in this letter Russell Hunt, Sloss-Sheffield's v.p. in charge of sales, got from an old friend:

> "From the small tonnage in that last car of pig iron, I feel that you must have started to load it yourself and got a little bit tired and said, 'Well, let it go on anyhow as it's time to go eat.'
> "Now, old fisherman, pick up two or three strong buck negroes, the blacker the negro the better they are, and load us out two healthy cars next week."

Cynical Sign

• • • Ray Kay, one of your Coast scouts, saw this sign in Los Angeles:

IN BUSINESS BY MISTAKE.
GOING OUT.

Stoppers

Why are Oscar's oranges fresh?—*Bell System.*

We're not "Sitting on our Backlog"—*Accurate Spring Mfg. Co.*

Charley Baur, your favorite family journal's v.p. and g.m., passes along this shipyard stopper, "Bottoms for Britain." Which reminds us to tell you that Len Rowlands, our neighbor on the 41st St. side of the office, asked a young lady what she was doing these days and she told him, "*I'm bundling for Britain.*"

Editorials to Be Reprinted

BOWING to an insistent demand, we plan to reprint in booklet form 30 or so of the latest editorials in the famous series by our president and editor-in-chief, John H. Van Deventer. They will be offset-printed on heavy paper, and will be supplied at cost, which will be somewhere in the neighborhood of twenty to twenty-five cents each. We'll let you know definitely next week.

He Invented a Line

• • • The anonymous and omniscient "Deac" puts us on the beam with regard to navigational systems:

> "There are numerous systems. For bluffing purposes, two of the most used are the Marc St. Hilaire and the Sumner Line, the latter having been evolved by a young officer of the U.S.S. Sumner during a voyage to England, after a prolonged storm had made other methods impossible. Just why, I forget.
> "Incidentally, 'The Marc St. Hilaire and the Sumner Line' has a swing reminiscent of Casey Jones. Suppose the captain has tried various fancy systems of calculations and continually makes his 'fix' in the Andes Mountains. The following ensues:
>
> The first mate said, 'Where can we be?
> I think we're lost on the salt, salt sea.'
> No there's two more systems I'll be trine,
> The Marc St. Hilaire and the Sumner Line."

Ess Trouble

• • • Ever since hearing Winston Churchill refer repeatedly to the United States in the plural—"*the United States are. . .,*" "*the United States have . . .,*" and so on—we have been overdoing our plurals. We wrote for instance, "*. . . another flock of letters come in. . .,*" and Lee Anderson of Detroit raps our knuckles for it.

Obviously, we were shy one ess. We found it in this sentence in Charley Post's "*News of the West Coast,*" our sparkling neighbor to your left: "*The Maritime Commission has allotted to Coast plants 122 engines for 'ugly ducklings' cargo vessels.*"

One Suffix Short

• • • "Layerout in a tank shop" is what a recent Help Wanted ad calls for. Our knowledge of tank shop terminology is as bare as the last five seconds of a striptease, but it seems to us an "er" is called for. Most jobs end in "er"—designer, welder, rivcter, plater, molder, treasurer, melter, roller, manager, and so on. So we hope the tank people will do something. *Layouter* would satisfy us, but *layerouter* is more mouth-filling and that would be our choice.

Puzzles

• • • You can corral all tricks in last week's bridge hand by leading the two of hearts and trumping in dummy. Then lead the club four. West can't discard a heart without eventually setting up hearts in declarer's hand, so whatever West blanks, North also discards. To the third trick lead the suit discarded and win in dummy. Now lead the heart ace, and from then on everything is rosy. If not, write and we'll send you full operating instructions.

You'll be able to knock this out in less than ten minutes:

> *A trotting horse makes 9.52 seconds better time in following the inner instead of the outer circumference of a circular race track 50 ft. wide. What is his speed?*

News of Industry

Canada Seizes and Operates Steel Car Plant At Hamilton

• • • **National Steel** Car Corp.'s plant at Hamilton, Ont., recently closed by a SWOC strike, has been taken over by the Canadian government and has been reopened to produce vitally needed shells, shell forgings and other munitions.

Other Canadian factories making needed defense equipment will likewise be taken over if production is tied up by action of employers or employees, C. D. Howe, Dominion Minister of Munitions and Supply said.

Seizure of the Hamilton plant is the first step of the kind in either Canada or the United States during the present war. At Hamilton, according to Dominion officials, the plant management had refused to rehire a union official.

"We felt the action of the company was unreasonable in refusing to take back one man who had been dismissed and whose reinstatement was recommended by the Board of Conciliation," Mr. Howe said. "Refusal of the company to employ this man was the cause of the strike. The government is prepared to take a strong stand to prevent a tie-up of war production."

By installing E. J. Brunning, Associate Minister of Munitions and Supply to operate the Hamilton plant as controller, full authority to manage all phases of the plant's business has been assumed by the Canadian government.

↓ ↓

• • • Full text of the government order by which Canada took over National Steel Car Corp's plant at Hamilton, Ont., follows:

1. That National Steel Car Corp. Ltd., a company having a place of business at the city of Hamilton, in the province of Ontario, is engaged in the manufacture of shells, shell-forgings and other munitions of war and supplies required for the prosecution of the war in which his majesty is now engaged;

2. That as a result of disputes which have arisen between the company and certain of its employees, a board of conciliation and investigation was appointed pursuant to the Industrial Disputes Investigation Act to deal with such disputes, and that, in an interim report made April 19, 1941, the board made certain findings and recommendations;

3. That the recommendations of the board have not been complied with by the company, and as a result of the failure of the company to comply with the said recommendations substantial numbers of employees of the company at its Hamilton plant have ceased work, thereby seriously interrupting or impairing the carrying on of the company's business and the production at the plant of munitions of war and supplies which are urgently required for the prosecution of the war;

4. That, in view of the foregoing, it is advisable for the security, defence, peace, order and welfare of Canada and the efficient prosecution of the war in which his majesty is now engaged that a controller be appointed to manage, operate and carry on the business, undertaking, affairs and operations of the company's Hamilton plant in the name and on behalf of the company;

Now, therefore, the undersigned has the honor to recommend that, under and by virtue of the powers conferred by the War Measures Act and Department of Munitions and Supply Act, it be authorized and directed as follows:

1. That Ernest John Brunning of Westmount, Que., be and he is hereby appointed controller of the business, undertaking, affairs and operations of the Hamilton plant of the company;

2. That the controller shall have the custody and control of the undertaking and all the property and assets of the company, insofar as the same relate to or are connected with the operations of the Hamilton plant, and shall have the power and authority, in the name and on behalf of the company, to manage, operate and carry on the business, undertaking, affairs and operations of the plant, and shall have power and authority in the name or on behalf of the company to:

(a) Bring or defend any action, suit or prosecution or other legal proceeding, civil or criminal;

(b) Draw, accept, make, endorse, discount, execute and issue promissory notes, bills of exchange, bills of lading, warrants and other

Photo by Harris & Ewing

MORE TANKS: Lord Beaverbrook, former British Minister of Aircraft Production, has been moved to Minister of State, a position in which he is expected to expand combat tank production and coordinate British industrial output for defense.

Stockholders Shut Out Of Car Plant Direction

• • • The Canadian government's order taking over operation of the National Steel Car Corp.'s Hamilton, Ont., plant said:

"Until revocation of the controller's appointment neither the board of directors nor the shareholders of the company shall be entitled, directly or indirectly, to manage, operate or carry on or control, supervise the management, operation or carrying on of the business, undertaking, affairs and operations of the plant."

negotiable or transferable instruments;

(c) Borrow any sum or sums of money which, in the opinion of the controller, is or are required for the carrying on of the business operations and undertaking of the plant, and give security therefor on all or any part of the plant and or any property and assets of the company used for the purpose of or in connection with the operation of the plant;

(d) Enter into contracts and execute deeds and other documents relating to the carrying on of the business and operations of the plant and for such purposes, use, when necessary, the seal of the company;

(e) Exercise the powers, authorities and rights which, but for the provisions of this order, would have been exercisable by the board of directors of the company;

(f) Do and execute all such other things as are necessary, advisable or expedient for the management, operation and carrying on of the business, undertaking, affairs and operations of the company's Hamilton plant;

3. That the controller shall exercise the foregoing powers and authorities subject to such instructions and directions, if any, as the minister of munitions and supply may from time to time see fit to give, provided, however, that all acts and things done by the controller hereunder shall, whether or not in contravention of such instructions or directions, be binding upon the company, and all persons are invited to act accordingly;

4. That he shall continue to be controller of the business, undertaking, affairs and operations of the company until his appointment as such is revoked by order in the Canada Gazette; the powers and authorities hereinbefore conferred upon the controller may be exercised at any time and from time to time until varied or revoked by order in the Canada Gazette;

5. Until revocation of the controller's appointment neither the board of directors nor the shareholders of the company shall be entitled, directly or indirectly, to manage, operate or carry on or control or supervise the management, operation or carrying on of the business, undertaking, affairs and operations of the plant;

6. That the controller and any person acting for or on behalf of or under the authority of the controller shall not be or become personally liable to any person (including the company, its creditors and or shareholders) for anything done or omitted in the exercise or purported exercise of any power or authority from time to time vested in or conferred upon the controller;

7. That any person violating or interfering with the exercise by the controller of any of the powers, authorities and rights conferred upon the controller shall be liable upon summary conviction to a fine not exceeding $5,000, or imprisonment for a term not exceeding five years, or to both fine and imprisonment. (C. D. Howe, Minister of Munitions Supply.)

Coming Events

May 8 to 9—National Metal Trades Association, annual convention, Chicago.

May 12 to 14—American Steel Warehouse Association, annual meeting, Los Angeles.

May 16 to 17—American Society for Metals, conference on hardening of metals, Philadelphia.

May 19 to 23—American Society for Metals, Western Metal Exposition and Congress, Los Angeles.

May 22—American Iron and Steel Institute, annual meeting, Waldorf-Astoria, New York.

June 1 to 6—Society of Automotive Engineers, summer meeting, White Sulphur Springs, W. Va.

New Priority Rating Aids Plane Plants

Washington

• • • To speed production of military airplanes for the United States and Great Britain, the OPM Priorities Division has granted special preference rating orders to a number of manufacturers of airframes, engines and propellers.

Two new orders, signed by E. R. Stettinius, Jr., Director of Priorities, will permit the manufacturers covered to extend preference ratings to deliveries from subcontractors quickly, without the necessity of having each such extension considered as a separate and distinct case, involving considerable paper work.

Because of the extreme importance of military airplanes in the defense program, the new preference rating orders are broader in coverage than any of the blanket orders hitherto issued. It is expected that the application of the new system to airplane production will save considerable time and will help producers and their subcontractors to facilitate the flow of necessary parts and equipment into completed defense aircraft.

The new system means that, in general, virtually all products flowing into airplane construction will enjoy a preferential status so that they can be made available as promptly as possible in production plants. The products affected by the new system, however, must be on the Priorities Critical list.

Engine and propeller makers who receive the order are granted a preference rating of A-1-c, and in the second order, specified manufacturers of airframes are granted a preference rating of A-1-d. Under the terms of the order a producer of engines, propellers or airframes may apply the preference rating to deliveries from subcontractors by executing a copy of his order and serving it on the subcontractor involved.

The subcontractor, in turn, may extend the rating to deliveries from his own subcontractors by going through the same procedure. Producers and their subcontractors who are included in the system may obtain necessary copies

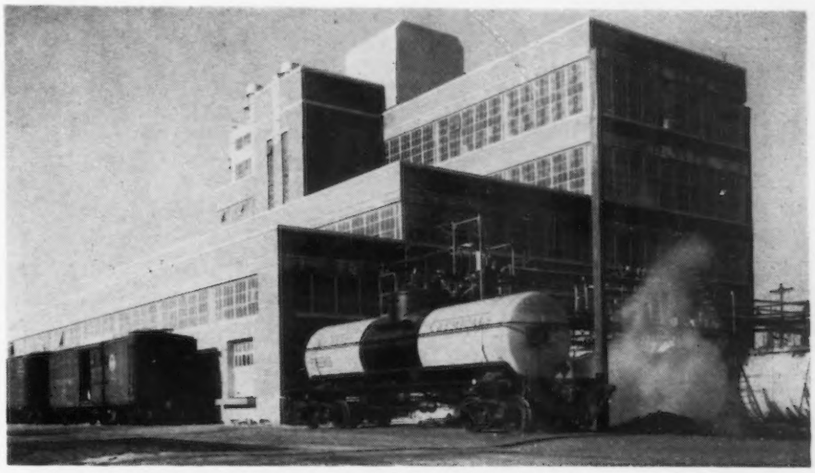
of the orders, and report forms, from the Division of Priorities or from contracting officers or inspectors of the Army and Navy. It is stipulated in the orders that one properly executed copy, served on a supplier, will automatically assign a preference rating for all deliveries of necessary material, whether these deliveries are for one or more separate orders.

The order for manufacturers of engines, propellers and airframes contains a paragraph which says that the preference rating is assigned:

"In favor of the producer (as hereinafter defined), and in favor of each rated subcontractor (as hereinafter defined), to be applied to deliveries of material entering directly or indirectly, at any stage of production, into airplane engines and propellers produced to fulfill the defense orders of the producer, always provided, however, that any such material is included in the current Priorities Critical List of the Army and Navy Munitions Board, as amended from time to time. . . ."

Another section of the order to engine, propeller and airframe makers, says that:

" 'Defense orders' as herein used shall mean any contracts or orders for airplane engines and propellers placed by the Army or Navy or for the defense of Great Britain including contracts or orders from other parts of the British Empire for that purpose or any contracts or orders for airplane engines and propellers for which the delivery schedule has been approved by the Joint Aircraft Committee."



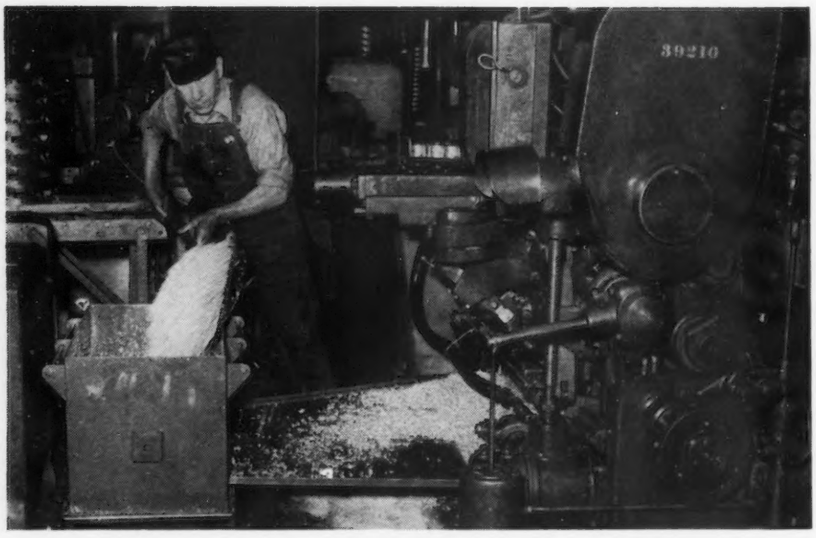
LARGEST SINGLE plant for production of plastic raw materials in this country was opened last week by Monsanto Chemical Co. at its Springfield, Mass., division works. In addition to Resinox, six other major plastics are being produced there. The new plant, replacing one at Edgewater N. J., was made necessary by expanding use of Resinox. During the last 10 years use of this material widened by research, has become familiar in radio cabinets, switches, washing machine agitators, adding machine, housings for electric razors and other appliances.

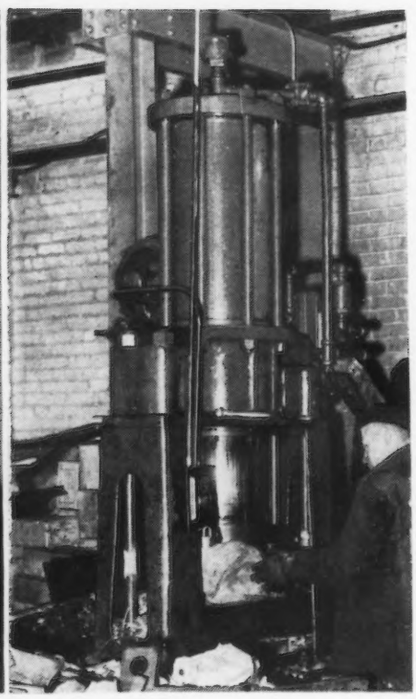
One section of each order provides that higher preference ratings than those assigned may be stipulated by Army and Navy Munitions Board directive, if necessary, in which case such higher ratings shall prevail.

It is stipulated that machine tools are excluded from the overall order, and that such tools shall be obtained in the usual manner, by means of individual preference rating certificates obtained from Army or Navy contracting officers. Certain cutting and perishable tools, however, are included, whether they are or are not on the Priorities Critical list.

The preferential status granted for airplane production in the orders will not apply to any producer or subcontractor until he has accepted the terms of the order, in writing, and has agreed to keep complete records of production, delivery dates, inventories, and other facts which the Priorities Division requires.

FIRST FIGHTER SQUADRON to be equipped with tricycle landing gear providing greater safety for takeoffs and landings is this 39th Squadron of the 31st Pursuit Group at Selfridge Field, Mich. The planes are Bell P-39 single seater fighters (Aircobras). In this model cannon and machine guns are mounted in the nose and the Allison liquid-cooled 1000 hp. engine is back of the pilot.





720 More Illinois Companies Seek Defense Contracts

Chicago

• • • **Another 720 potential** defense contractors embracing a total of 31,720 available machines were submitted to the local OPM. List covers Illinois firms who are good prospects especially for defense subcontracting.

The list is the result of a survey among relatively small manufacturers in the state, whose facilities had not earlier been scanned by one of the procurement divisions of the army, or by the Ordnance Department.

About half of the machines, or a total of 15,290, were idle part of the time, equivalent to 24,678 working days of 8 hr. In the list submitted, 260 plants already had some defense work; 51 being primary contractors, 146 subcontractors and 63 serving in both capacities. Total of 315 plants had no armament work but want it. And 244 plants were willing to install equipment to handle government work. Of 106,297 employees, 31,162 are skilled and 52,917 unskilled. But over 200 plants said 18,284 additional workers would be needed to meet demands of skilled labor to step up production. More than half the plants said they could expand production within three months without hiring skilled workers. Training programs are already installed in 274 of the firms. Sixteen industries are included in the list of plants.

SCRAP CONSERVATION in the U. S. is likely to increase as the defense program gains headway, requiring metals like those reclaimed at Buick plants. O. W. Young (left), Buick's general manufacturing manager, reports 280 carloads and 65 truckloads of salvaged material are shipped monthly. Top photo shows removal of metal cuttings from a machine which cuts ring grooves in pistons while the center picture is of a hydraulic press being used to mutilate parts, crack castings to remove bolts, break up culled subassemblies and press out bushelings. Below are workmen salvaging some of the 545,000 lb. of scrap aluminum reclaimed by Buick last year.

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BUFFALO, N. Y.	*Root, Neal & Co.*
BORGER, TEXAS	*Hart Industrial Supply Co.*
BOSTON, MASS. (Belmont)	*H. Boker & Co., Inc.; W. E. Fluke*
CHICAGO, ILL.	*Machinery & Welder Corp.*
CINCINNATI, OHIO	*Williams & Co., Inc.*
CLEVELAND, OHIO	*Williams & Co., Inc.*
COLUMBUS, OHIO	*Williams & Co., Inc.*
DETROIT, MICHIGAN	*C. E. Phillips & Co., Inc.*
ERIE, PENNA.	*Boyd Welding Co.*
FT. WAYNE, IND.	*Wayne Welding Supply Co., Inc.*
HONOLULU, HAWAII	*Hawaiian Gas Products, Ltd.*
HOUSTON, TEXAS	*Champion Rivet Co. of Texas*
INDIANAPOLIS, IND.	*Allied Weld-Craft, Inc.*
KANSAS CITY, MO.	*Welders Supply & Repair Co.*
KINGSPORT, TENN.	*Slip-Not Belting Corp.*
LOS ANGELES, CALIF.	*Ducommun Metals & Supply Co.*
MILWAUKEE, WIS.	*Machinery & Welder Corp.*
MOLINE, ILL.	*Machinery & Welder Corp.*
NEW YORK, N. Y.	*H. Boker & Co., Inc.*
OKLAHOMA CITY, OKLA.	*Hart Industrial Supply Co.*
PAMPA, TEXAS	*Hart Industrial Supply Co.*
PITTSBURGH, PA.	*Williams & Co., Inc.*
PORTLAND, OREGON	*Industrial Specialties Co.*
ROCHESTER, N. Y.	*Welding Supply Co.*
SAN FRANCISCO, CALIF.	*Ducommun Metals & Supply Co.*
SEATTLE, WASH.	*H. A. Cheever Co.*
ST. LOUIS, MO.	*Machinery & Welder Corp.*
SYRACUSE, N. Y.	*Welding Supply Co.*
TOLEDO, OHIO	*Williams & Co., Inc.*

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Then, too, A-S-E Unit-Robes fit anywhere—between doorways, in corners, anywhere in space that might otherwise be unusable. They are built in 16 unit single-row and 32 unit double-row sections. Though each section is complete in itself, sections can be grouped to fit any available space. They're easily erected—easily moved—easily cleaned. Send for full information today—no obligation.

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There is a type and size for every industrial need. Hundreds of thousands of A-S-E Lockers are now in use—proving their durability and satisfactory performance. Sturdily constructed, A-S-E Lockers eliminate the maintenance costs so common with ordinary lockers. Mail the coupon for the facts.

A-S-E SHOP EQUIPMENT SPEEDS HANDLING AND STORING

Industry speed-up is making the most of this well-designed and well-built equipment. It's saving time on the assembly lines . . in the stock rooms . . . in inter-departmental handling . . . in many parts of the plant. Mail the coupon for catalog, describing the time- and money-saving advantages of A-S-E Stacking Boxes, Stack-Units, Shop Boxes, Taper Pans, etc. No obligation.

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Galion Plants Bright Spot In Defense Drive

Galion, Ohio

• • • **This city of around** 9000 population is a bright spot in the national defense picture, in sharp contrast to some other mid-Ohio communities.

Roadmaking equipment, truck cargo bodies, signal equipment, metallic grave vaults and garments are all under heavy demand today. Workers are coming here from surrounding cities.

The North Electric Co. is employing around 900 persons and working 24 hours per day on large orders for signal equipment for the government. Galion Metallic Vault Co., U. S. Steel Vault Co., Perfection Steel Body and Steel Abrasives Co., all boast big payrolls.

Busy for years past, Galion Iron Works & Mfg. Co. has reached a peak of activity which its officers hardly believed possible. The company holds a four-month order backlog for roadbuilding equipment and is operating two shifts 55 hr. per week. About 550 persons are employed at the plant.

Heavy purchases for the construction of leased air bases now face the roadmaking equipment industry. Galion Iron Works & Mfg. Co. is nearing the completion of 71 8-to-10-ton power driven rollers for the government and is scheduled to receive a new contract for 75 of these big rollers.

This company had one of the first priority ratings issued, due to the importance of air field construction. The rating enabled the purchase of many machine tools for the company's large machine shop. Considerable expansion in other departments has been made. The company operates its own foundry and makes practically all parts except motors, tires and cabs.

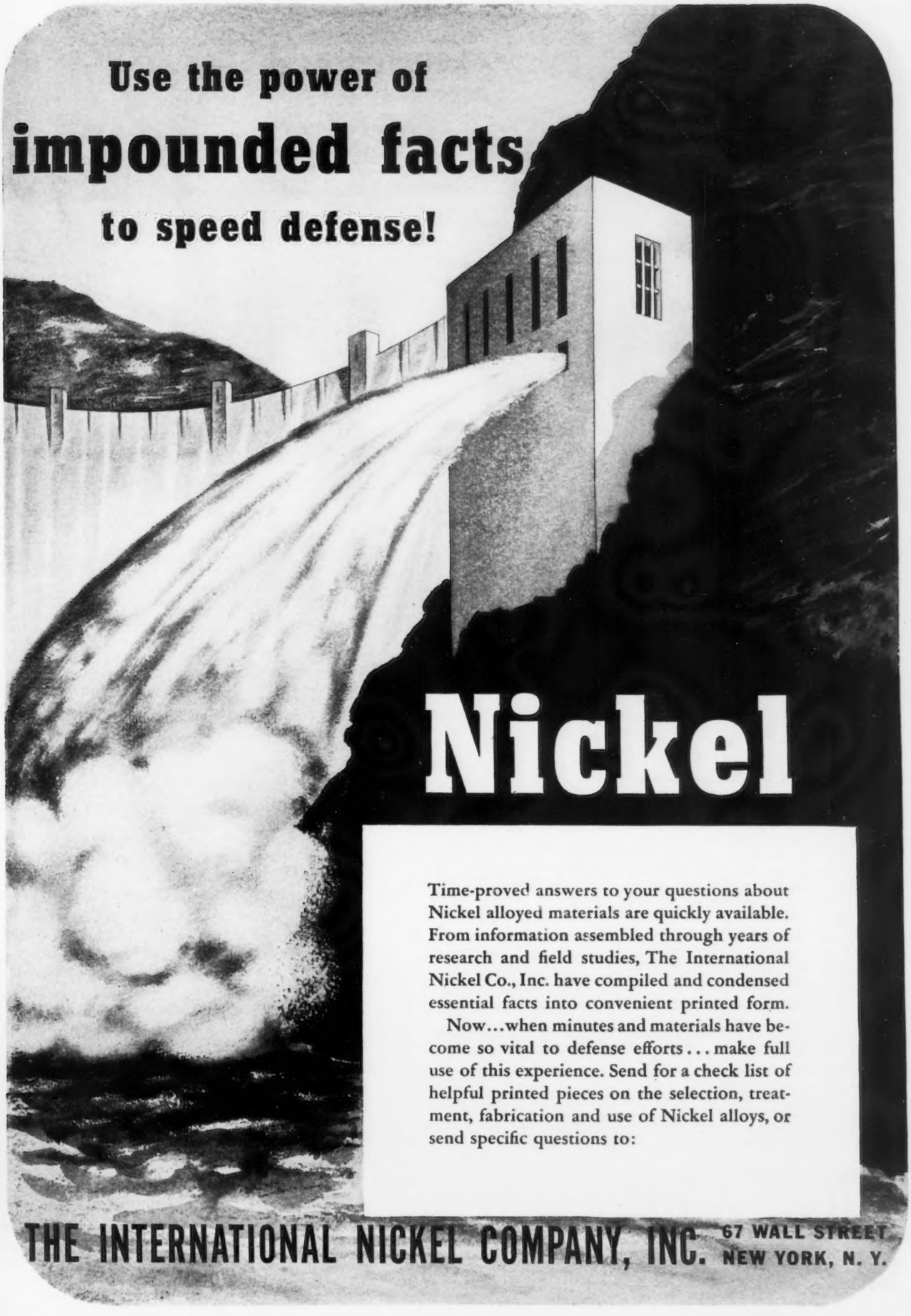
Officials sight increasing difficulty obtaining materials and an especially critical situation seems to be arising on steel plates, of which large quantities are used in manufacture of road building equipment.

More alloy steel than ever before is being used in rollers, graders and kindred machinery but it is likely substitutions can be effected if necessary.

Every effort is being made to serve normal peacetime buyers, but from all indications contractors not engaged in government work will have to repair their old equipment and keep it running as long as possible under present circumstances. Already Galion Iron Works is doing much repair work.

(For its size, Galion is an exceptionally large steel consumption center. Some steel sellers claim it holds first place in per capita consumption among cities of comparable population.)

GALION ROAD-BUILDING equipment (in action below) is used in building airfields in the defense program.

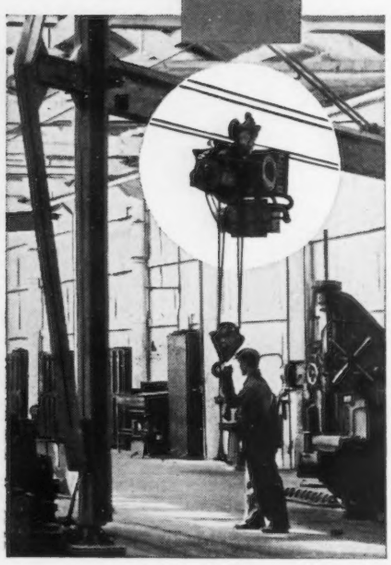


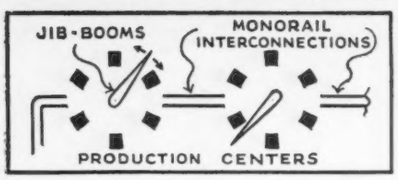
Time-proved answers to your questions about Nickel alloyed materials are quickly available. From information assembled through years of research and field studies, The International Nickel Co., Inc. have compiled and condensed essential facts into convenient printed form.

Now...when minutes and materials have become so vital to defense efforts... make full use of this experience. Send for a check list of helpful printed pieces on the selection, treatment, fabrication and use of Nickel alloys, or send specific questions to:

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

HEARD ABOUT CIRCULAR PRODUCTION CENTERS?





Here is a time-saving idea for plants performing a series of non-standard operations on heavy blocks of metal. Arrange machines by general types in groups down the shop, i.e. all borers together, all planers together, etc. Then space each machine of a group in a circle, facing inwards. Serve each circle with a revolving jib-boom crane, carrying traveling electric hoists. Interconnect jib-booms with short monorail sections.

Results: Jobs of any character may be routed through the shop in continuous production without being removed from original hoist. All machines of all sizes and types available for work on any job. Installation illustrated is in the shops of a Class I railroad. Reading equipment throughout. Write for details.

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Chain Hoists, Electric Hoists, Cranes and Monorails

Inventory Control Plan Begun By OPM

Washington

• • • **As a curb against building** up artifically large inventories, the OPM Priorities Division has inaugurated a system of inventory control, under which both suppliers and consumers of iron and steel and 15 other classifications of metals are required to reduce shipments to over-stocked customers and file sworn compliance statements. Plans for a field staff to make audits and spot check inventories are being developed for prompt application.

The inventory control, which follows a request to Congress by Director of Priorities Edward R. Stettinius, Jr., for specific statutory authority for the exercise of inventory control as part of a broader priorities system, provides that shipments of the metals covered may not be made to customers in amounts which would increase the customers' inventories to "unnecessary levels." The measure of "unnecessary levels" would depend upon the customer's usual method and rate of operation.

These metals, which in addition were added to the priorities critical lists, were covered in the inventory control order:

Antimony; cadmium; chromium; cobalt; copper; ferrous alloys, all types; iridium; iron and steel products, including rolled, drawn, forgings, castings and pig iron; lead; manganese or spiegeleisen; mercury; molybdenum; non-ferrous alloys, all types; tin; vanadium; secondary materials, or scrap, containing any of the metals listed herein or any metals already subject to an order of the Director of Priorities, prepared for sale in order to recover the metal content thereof.

Mr. Stettinius characterized the new control as "part of a coordinated program aimed at the development of broad inventory regulations in the interests of national defense," and warned that failure to comply with the initial requirements is likely to result in the imposition of more drastic controls.

"It must be especially emphasized," Mr. Stettinius said, "that no real advantage can be gained by the building up of excessive inventories, because such a situation will be corrected by us as rapidly as possible, by withholding further supplies until such excess inventories have been reduced to minimum reasonable working levels."

The next step in the coordinated program will be the distribution of questionnaires to the industries affected so that the Priorities Division can get complete inventory information. Another step will be the withholding of supplies from any users whose inventories are excessive to the extent necessary to reduce them to reasonable levels.

Mr. Stettinius explained that the materials affected are not being subjected to industry-wide mandatory priorities which thus far covers aluminum, magnesium, nickel, nickel-bearing steel, ferrotungsten, machine tools and neoprene. Zinc is subject to partial control through a production pool.

The inventory control order was sent to all producers, smelters, re-melters, brokers, distributers (warehouse or wholesale), processors and fabricators.

Customers of a supplier are required to make a sworn statement covering inventories during the preceding calendar month, the statement in turn being forwarded to OPM by the supplier. Exempted from the order were

James F. Towers Gives Up Priorities Post

Washington

• • • Resignation of James F. Towers as assistant director of OPM's division of priorities last week prompted Director of Priorities Edward R. Stettinius, Jr., to name Emil Schram, board chairman of the Reconstruction Finance Corp., as Mr. Towers' successor.

Mr. Towers returns to New York where he is executive vice-president of Ford, Bacon & Davis, Inc., industrial engineering company. Mr. Schram, who has been with the RFC since 1933 was formerly an Illinois farmer. He will retain his post as president of the Defense Plant Corp., RFC subsidiary, and as chairman of the RFC.

Increased Heat-treating Capacity

S.A.E. ALLOY BILLETS AND BARS; OXIDATION AND CORROSION RESISTING STEELS; TOOL AND SPECIAL STEELS; AIRCRAFT QUALITY STEELS; STAINLESS STEELS

With three Heat-treating Furnaces, three Draw Furnaces, three Oil Quench Tanks, one Water Quench Tank and twelve Annealing Furnaces in operation May first, 1941, the capacity of our Heat-treating and Annealing Departments will be more than trebled.

Aristoloy Alloy Steel Bars can be supplied in all these conditions: Hot Rolled—Annealed or Normalized—Spheroidized Annealed—Heat-treated — Cold Drawn — Straightened — Turned — Centerless Ground—or in any combination of these conditions. Aristoloy steels can also be furnished as Pressed Blooms and Billets.

ELECTRIC FURNACE AND OPEN HEARTH ALLOY STEELS

ARISTOLOY STEELS

COPPERWELD STEEL COMPANY · WARREN, OHIO

deliveries by any supplier of ores or concentrates of any of the materials listed which are consigned to primary processor or smelters; importers of the materials covered; and deliveries by suppliers of any of the designated secondary materials or scrap consigned to smelter or re-smelters producing such secondary materials therefrom for sale.

The order was made effective May 1.

Suit Against Defense Plant Noise Withdrawn

Cleveland

• • • **After being lectured** by the court on the urgency of the national defense program, a group of householders withdrew their suit to enjoin the pounding of steam hammers at the plant of Steel Improvement & Forge Co. here.

There's no substitute for SKILL in Steel Making

ANDREWS STEEL

INDUSTRY generally has graduated from "rule of thumb." In today's production, guess work and indecision have given way to scientific control . . . methods have rapidly approached standardization, and precision operation is the accepted and essential procedure.

Yet all the modern, intricate safeguards and robot devices have not displaced the craftsmen, whose steel-making skill still puts in iron and steel products greater value and superior performance.

Andrews is proud of its production facilities and the excellence of its products . . . prouder of the men in plant and laboratory whose years have perpetuated the craftsmanship of fine steel making.

To those who seek quality products and a wholly dependable source of supply, Andrews offers many profitable advantages.

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ANDREWS PRODUCTS IN CARBON AND ALLOY STEEL: Bars • Plates • Universal Mill Plates • Sheet Bars • Billets • Blooms • Slabs

Steel Welding Wire Output at New Peak

• • • **Production of steel** welding wire rose to 238,795,000 lb. in 1940, a new high record, according to information received by the American Iron and Steel Institute. The increase reflected wider use of welding processes than ever before in shipbuilding, construction work, the manufacture of home equipment and numerous other fields.

Last year's output of welding wire represented an increase of 30 per cent over the 1939 production of 183,436,000 lb. the highest total previously recorded. Between 1932 and 1940 the production of steel welding wire rose 989 per cent. This gain was more than twice the increase in production in steel ingots which amounted to 442 per cent between 1932 and 1940.

Nearly 5 lb. of welding wire were produced last year for each net ton of finished steel produced, compared with 2.6 lb. in 1939.

Explosives Inspection Classes Started At Purdue

• • • **Purdue University** next month begins classes covering inspection of explosives. Courses, under supervision of the general engineering department, are open to industrial workers in Lafayette, Indianapolis, South Bend and Terre Haute.

Norfolk Southern Sold

• • • **Norfolk Southern** Railroad Co.'s properties and equipment were sold April 30 for $2,000,000 to Carrol M. Shanks of the Prudential Insurance Co. of America who will act as reorganization manager. The road operates 733 miles of track and has been in receivership since 1932. The sale will go before the district court in Norfolk, Va., on May 14 to be confirmed.

Crane Co. Wages Up 10%

• • • **A 10 per cent** wage increase has been voluntarily given to 10,000 employees of the Crane Co. The increase applies to hourly and piecework employees and was not the result of negotiations but was "in line with the times."

Countershaft
Gear Blanks Drilled
2 1/32" dia. at 79 R.P.M.
Customers Say..
"CLE-FORGE HIGH SPEED DRILLS PRODUCE MOST HOLES PER GRIND, MOST GRINDS PER DRILL"

Covered with chips in the main picture is a gear blank forging—rapidly losing its "blank" as a "Cle-Forge" High-Speed Drill produces a hole $2\frac{1}{32}$" diameter x 2½" deep. Spindle feed rate is .009 at 79 r.p.m. Today, Companies equipped with machinery for producing vital defense orders such as heavy automotive parts, can confidently project the heaviest drilling schedules, knowing they will be completed on time.

Here at your service are Cle-Forge High-Speed Drills —designed by trained Research Engineers especially to work your particular material accurately and at maximum speed.

This Company's continual purpose is to supply Drills and Reamers that will do the most work and cost you the least money. Please telephone any "Cleveland" Stockroom or your usual source of supply.

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When lifting costs

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There's one sure way to speed up production and cut down lifting costs. INSTALL 'BUDGIT' HOISTS. They save money — and men.

Don't let the productive energy of your workmen be dissipated by lifting dead weight! Let the energy SAVED by 'Budgits' produce faster and more work. It will pay in greater profits and in the FREEDOM FROM STRAIN AND RUPTURE of your men.

'Budgit' Hoists are small portable electric hoists that lift the tiring burdens and DO THE JOB MORE QUICKLY AND CHEAPLY. There are no installation costs . . . Simply plug into any electric socket.

'Budgits' come in sizes to lift loads up to 250, 500, 1000 and 2000 pounds with speeds to suit today's needs. Prices start at $119.00.

Send for catalog containing complete information, also, "Time Saving Calculator" that shows savings they earn.

'BUDGIT' HOISTS

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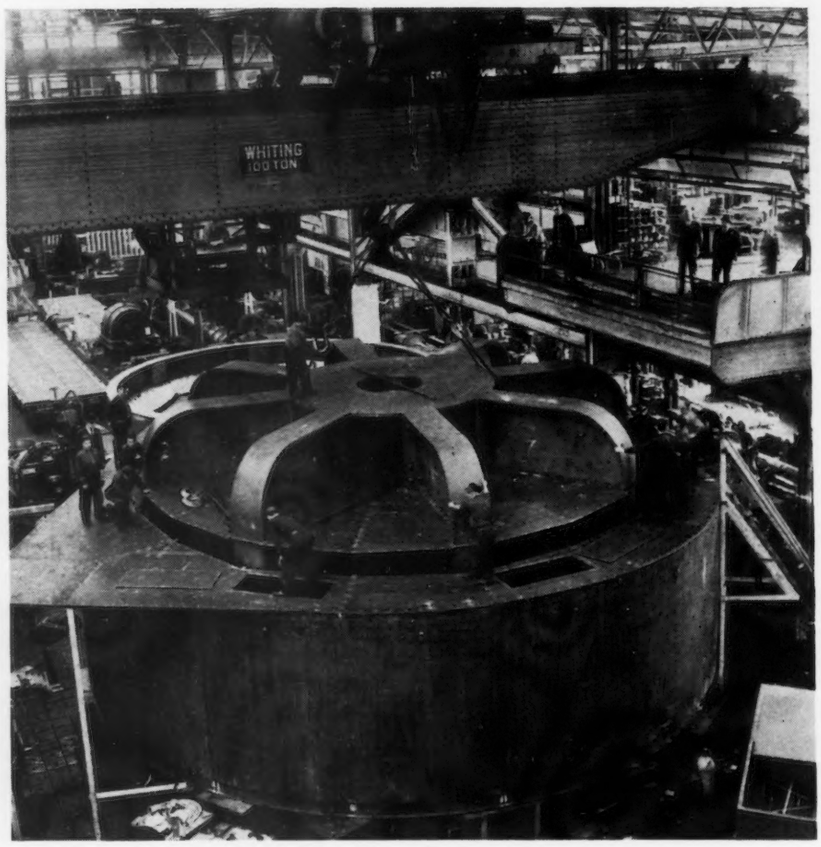
MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Makers of all types and sizes of Electric and Hand Operated Cranes and Electric Hoists . . . Send all your crane and hoist inquiries to Shaw-Box!



FIRST OF FOUR 75,000-kva. waterwheel-driven generators being built by General Electric Co. for Shasta Dam on the Sacramento river is pictured here. The 8-arm piece being handled during shop assembly in the Schenectady, N. Y., works is the upper bearing bracket which supports the thrust bearing and one of the guide bearings.

Steel Warehouse Chapters Elect

Cleveland

• • • **The following chapters** of the American Steel Warehouse Association have elected officers as follows for the coming year, W. S. Doxsey, executive secretary, announces:

Central States Chapter: president, Herbert Douglas, Central Steel & Wire Co.; vice-president, L. B. Kidwell, General Steel Warehouse Co., Inc.; vice-president, E. G. Fisher, National Steel Co.; treasurer, H. J. Lord, Scully Steel Products Co.; secretary, A. J. Kueber, Steel Warehousing Corp.; all of Chicago; national director, C. H. Bradley, W. J. Holliday & Co., Indianapolis.

Connecticut Chaper: president, R. B. Shearer, The C. S. Mersick & Co., New Haven; vice-president, S. H. Hascall, The Blodgett & Clapp Co., Hartford; secretary-treasurer, G. S. Brousso, The C. S. Mersick & Co., New Haven. R. B. Shearer was elected chapter director.

Missouri Valley: president, G. E. Heimovics, Milcor Steel Co., Kansas City, Mo.; vice-president, F. J. Daugherty, Gate City Iron Works, Omaha, Neb.; secretary-treasurer, Fred L. Evans, Steel Mfg. & Warehouse Co., Kansas City; national director, Henry Neef, Gate City Iron Works, Omaha.

Buffalo Chapter: president, R. B. Barnett, Peter A. Frasse & Co., Inc., Buffalo; vice-president, W. Barry Huntley, Brace-Mueller-Huntley, Inc., Rochester; secretary-treasurer, T. W. Knight, Wheelock, Lovejoy & Co., Inc., Buffalo; national director, J. F. Rogers, Beals, McCarthy & Rogers, Inc., Buffalo.

Detroit Chapter: president, N. A. Wade, Edgar T. Ward's Sons Co.; secretary-treasurer, E. W. Lynch, Union Drawn Steel Division, Republic Steel Corp.; national director, E. M. Vehmeyer, Joseph T. Ryerson & Son, Inc., all of Detroit.

New York Chapter: president, Charles Kramer, Scully Steel Products Co., Newark; vice-president, William C. Hughes, Bright Steel Corp., New York City; vice-president, H. B. Royer, Jones & Laughlin Steel Service, Inc., Long Island City; secretary-treasurer, Paul O. Grammer, Grammer, Dempsey & Hudson, Inc., Newark. Mr. Kramer was also elected national director.

Northwest: president, L. H. Williams, Williams Hardware Co., Minneapolis; vice-president, Joseph Paper, Paper, Calmenson & Co., St. Paul; secretary, Winter Dean, Nicols, Dean & Gress, St. Paul. Mr. Williams was also elected national director.

Philadelphia Chapter: president, J. W. Patrick, Jr., Peter A. Frasse & Co., Inc.; secretary-treasurer, J. M. Mead, Joseph T. Ryerson & Son, Inc.; national director, Guy P. Bible, Horace T. Potts Co., all of Philadelphia.

Pittsburgh Chapter: president, J. H. Fogwell, Scully Steel Products Co., Pittsburgh; vice-president, J. M. Hilbish, Jones & Laughlin Steel Corp., Pittsburgh; secretary, D. Davia, Bethlehem Steel Co., Carnegie, Pa.; treasurer, R. B. Lorenz, Edgar T. Ward's Sons Co., Pittsburgh; national director, A. W. Herron, Jr., Jones & Laughlin Steel Corp.

St. Louis Chapter: president, George K. Conant, Sligo Iron Store Co.; vice-president, H. G. Thompson, Scully Steel Products Co.; secretary, Bruce Haines, E. E. Souther Iron Co.; treasurer, E. W. Fleer, Schurk Iron Works, Inc., all of St. Louis. Mr. Conant was also elected national director.

Fast Handling Methods

Big Lifts—Quick Releases

- The Lifting Magnet Method is an excellent means for handling scrap or pig iron, castings, finished products, etc., because it not only moves large quantities of material in a short time and at low cost, but it also performs tasks that are too dangerous or difficult to do by other means.

- Look at these illustrations of EC&M Lifting magnets at work, for example. There's no waiting for hook-on men. No chains to slip . . . or to damage polished surfaces. In addition, the Lifting Magnet can be used, when necessary, for 24-hour handling service.

- And in recent years, many New Magnets are replacing ones of older design. Users find that faster handling of materials with New Magnets permits a saving that returns the cost of the original investment in a very short time. Ask for a copy of Bulletin 900 which describes these efficient, material-handling tools.

- THE ELECTRIC CONTROLLER & MFG. COMPANY, 2670 East 79th Street, Cleveland, Ohio

EC&M LIFTING MAGNETS

We've kept in step... so far

● With greatly enlarged facilities, extra time and the complete and ready cooperation of our entire factory personnel . . . we've been able to meet your increased demands for Twin Disc Clutches . . . to supply the needed parts for service from our 28 parts and service offices. During the coming months, should our feet lag temporarily . . . we ask your indulgence . . . we will do our best to keep on "keeping in step."

1. *Heavy-duty Clutch*
2. *Power Take-off*
3. *Marine Reverse and Reduction Gear*
4. *Hydraulic Torque Converter*
5. *Machine Tool Clutch*

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
REG. U.S. PAT. OFF.

TWIN DISC CLUTCH COMPANY, 1370 RACINE ST., RACINE, WIS.

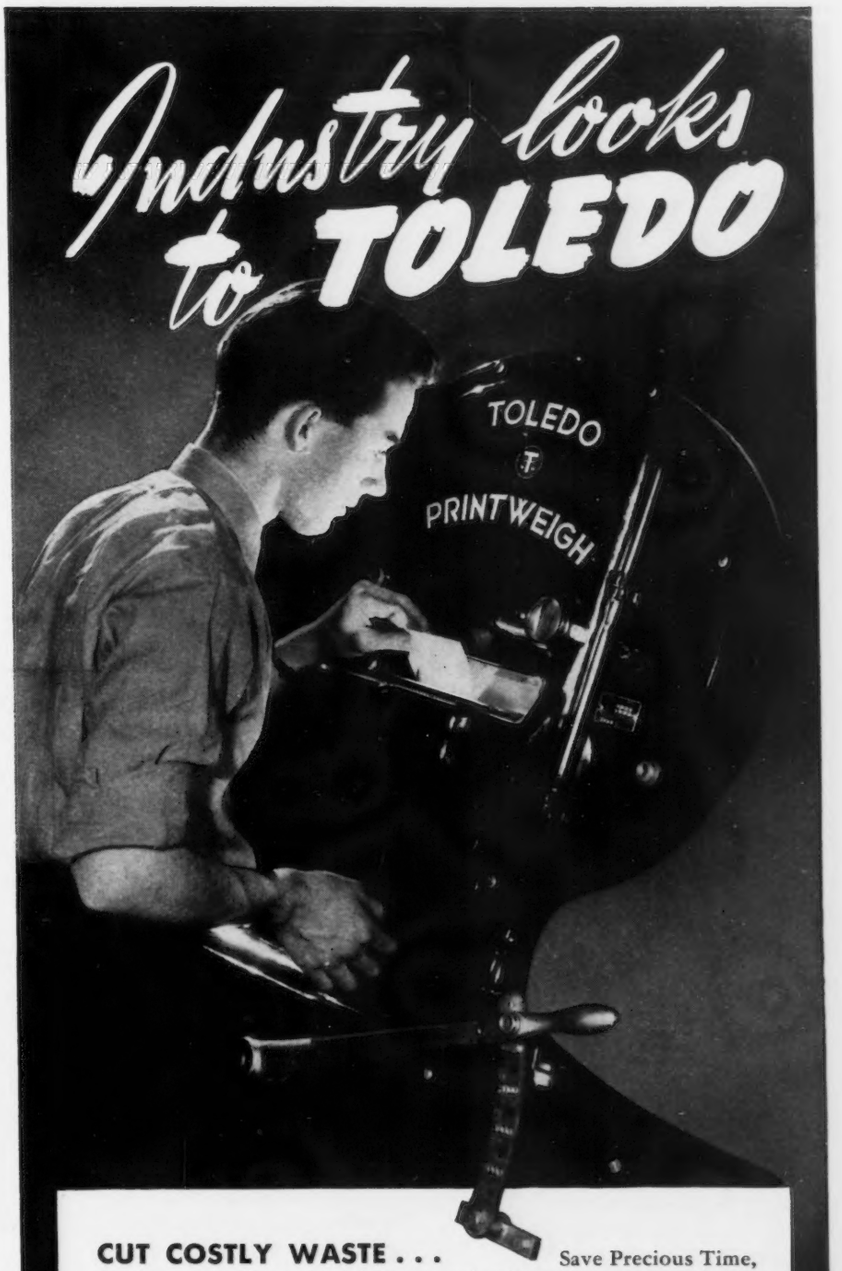
Government Awards

Navy Dept., Bureau of Supplies and Accounts:

Aberthaw Co., Boston; shipbuilding dry dock $2,500,000
Air Reduction Sales Co., New York; torches, oxyacetylene, welding 15,055
Allegheny Ludlum Steel Corp., Brackenridge, Pa.; steel, corrosion resisting 85,360
Allis-Chalmers Mfg. Co., Milwaukee; two turbo-alternators and accessories 263,522
American Blue Print Co., Inc., New York; instruments, drawing, first grade with case 9,810
American Fork & Hoe Co., Cleveland; axes, hammers and sledges 51,245
American-LaFrance-Foamite Corp., Elmira, N. Y.; extinguishers, fire 18,678
American Mason Safety Tread Co., Lowell, Mass.; treads, safety, type A, brass base 53,100
American Metal Co., Ltd., New York; solder, tin-lead, bar 20,346
American Steel & Wire Co., Washington; cable, electric, insulated 5,743
Anaconda Wire & Cable Co., New York; cable, electric 490,064
Armstrong Brothers Tool Co., Chicago; clamps, C, type I, class D, heavy service 23,026
Atlas Car & Mfg. Co., Cleveland; locomotive, 50-ton, diesel, and spare parts 16,490
Atwood & Merrill Co., Salem, Mass.; expansion of shipbuilding facilities 209,000
Austin-Western Road Machinery Co., Aurora, Ill.; sweepers, street, gasoline motor-driven 7,218
Bogue Electric Co., Paterson, N. J.; sets, motor generator 125,460
Brown & Sharpe Mfg. Co., Providence; machine, grinding, universal, tool and cutter, motor driven 5,139
machines, screw, automatic 17,982
Buda Co., Washington; sets, generating, electric; diesel and spare parts 78,406
Carnegie-Illinois Steel Corp., Washington; steel, bar 21,134
Carroll Chain Co., Columbus, Ohio; chains and fittings 12,127
Caterpillar Tractor Co., Peoria, Ill.; tractors, gasoline engine driven 5,626
Chelsea Clock Co., Chelsea, Mass.; clocks, boat 9,400
Cincinnati Planer Co., Cincinnati; planer, double housing 21,875
Cincinnati Tool Co., Cincinnati; clamps, C, Type I and screw, quick adjusting 27,090
Climax Molybdenum Co., New York; ferro molybdenum 13,465
Clyde Iron Works, Inc., Duluth, Minn.; winches, steam driven .. 5,190
Collyer Insulated Wire Co., Pawtucket, R. I.; cable, electric ... 79,525
Crane Co., Washington; valves, gate, globe and angle 350,000
Crescent Insulated Wire & Cable Co., Trenton, N. J.; cable, electric 43,755
Dana Tool-D Nast Machinery Co., Philadelphia; chucks, drill 9,835
DeLaval Steam Turbine Co., Trenton, N. J.; pumps, motor-driven, spare parts, tools and wrenches 461,950
Diagraph Bradley Stencil Machine Corp., St. Louis; machines, stencil cutting 12,650
Diehl Mfg. Co., Elizabethport; generators, motor, with controllers and field rheostats; spare parts 16,490
fans, ventilating 8,520
Durabilt Steel Locker Co., Aurora, Ill.; lockers, metal, clothes 10,720

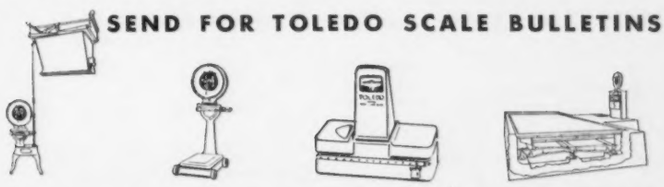
AWARDS

Easton Car & Construction Co., Easton, Pa.; trucks, transportation, electric 11,592
Electric Boat Co., New York; 12 motor torpedo boats and 12 motor boat submarine chasers 5,108,880
Electric Heating Equipment Co., Philadelphia; units, resistance.. 62,325
Electro Metallurgical Sales Corp., New York; ferro vanadium ... 8,400
Elliott Co., Ridgway, Pa.; spare parts for use with main generating sets 33,078
Eureka Electrical Products Co., North East, Pa.; hammers, copper, type G 5,297
Ex-Cell-O Corp., Detroit; plant facilities for manufacture of aircraft parts and assys. 3,506,657
Fairbanks, Morse & Co., Beloit, Wis.; eight sets of propelling machinery for coastal mine sweepers 311,200
Fibre-Metal Products Co., Chester, Pa.; helmets and shields, welders' 30,996
Garland Mfg. Co., Saco, Maine; hammers, hide face 9,744
General Cable Corp., Washington; cable, electric 12,376
General Electric Co., Schenectady; motors, brakes, switches 9,973
locomotives, diesel, elec. 49,600
equipment for outdoor substations 171,345
sets, motor generator 975,698
cable, electric 5,788
General Motors Corp., Harrison Radiator Div., Lockport, N. Y.; coolers, oil 29,943
Gleason Works, Rochester, N. Y.; generators, bevel gear 10,838
Graybar Electric Co., Inc., Washington; cable, marine use 8,994
Gould & Eberhardt, Newark; machine, gear hobbing 8,678
Hamilton Watch Co., Lancaster, Pa.; chronometers 78,475
C. I. Hayes, Inc., Providence; furnaces, electric 18,500
Hooven, Owens, Rentschler Co., Hamilton, Ohio; head, lower cylinder, complete 5,634
International Nickel Co., Inc., New York; nickel, electrolytic 32,050
Jones & Lamson Machine Co., Springfield, Vt.; grinder, automatic-thread 19,651
Kearney & Trecker Corp., Milwaukee; machines, milling 39,327
Kester Solder Co., Chicago; solder, tin-lead, wire, flux-cored 8,726
Landis Tool Co., Waynesboro, Pa.; grinders, cylindrical, plain 78,652
Lodge & Shipley Machine Tool Co., Cincinnati; lathes, engine, heavy duty 56,200
Los Angeles Shipbuilding & Dry Dock Corp., San Pedro, Cal.; three seaplane tenders 39,750,000
Master Rule Mfg. Co., Inc., Bronx; rules, tape, steel 6,859
Matthews Co., Port Clinton, Ohio; launches, motor 65,150
James H. Matthews & Co., Pittsburgh; figures and letters, steel, stamping 27,066
McKay Co., Pittsburgh; chains and fittings, mooring rings 16,546
Fred Medart Mfg. Co., St. Louis, Mo.; lockers, metal, clothes ... 20,817
Alexander Milburn Co., Baltimore; torches, oxyacetylene, cutting .. 36,300
Millers Falls Co., Greenfield, Mass.; rules, steel, spring tempered .. 5,618
National Electric Products Corp., Pittsburgh; cable, electric 21,061
National Lead Co., Baltimore Branch, Baltimore; solder, tin-lead, wire and bar, grades A and D 43,366
Noland Co., Inc., Washington; adzes, ship carpenter's; hammers, scaling 5,543
North American Smelting Co., Philadelphia; metal, anti-friction, ingot 155,084



CUT COSTLY WASTE . . . Save Precious Time, get the result of every weighing-operation in an accurate, permanent, *printed* record . . . that's what you can do with the Toledo Printweigh. Yet this is only one of the more than 45,000 variations of the basic Toledo models, ready to help you increase production and Guard Profits through greater *speed* and *accuracy* in your weighing, counting, and force-measuring. With years of *experience,* finest manufacturing facilities, and outstandingly successful *research,* look to *Toledo* for the solution of the toughest problems in weighing . . . 181 Sales and Service Offices in U.S. and Canada. Toledo Scale Company, Toledo, O.

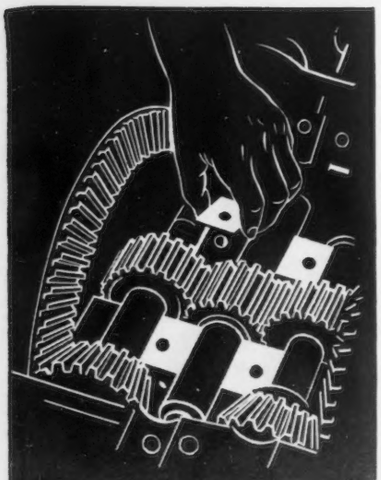
SEND FOR TOLEDO SCALE BULLETINS



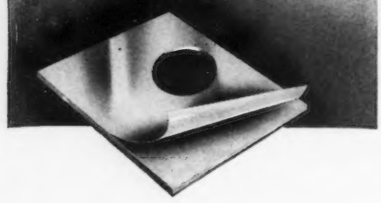
. . . on hopper scales ☐ *. . . on portable and bench scales* ☐ *. . . on over-under checking scales* ☐ *. . . on motor truck scales* ☐

. . . on Printed Weights ☐ *. . . on Automatic Cut-offs and Batch Controls* ☐

IA81



if *you've* bought a machine



—or intend to...

Probably Laminum shims are standard equipment on your new purchase. If not, when you service it use Laminum for quick adjustments of bearings and fitted mechanical parts. It pays! Simply *peel* off .002 or .003 inch brass laminations. For *precision* adjustment! • *Shims cut to your specifications . . . stock shim materials are sold by mill supply distributors.*

Laminated Shim Co., Inc.
76 Union St., Glenbrook, Conn.

Write for file-folder of shim application photos—with Laminum sample.

LAMINUM

THE SOLID SHIM THAT *peels* FOR ADJUSTMENT

A-1170

Norton Co., Worcester; grinders, tool and cutter, universal 6,605
Norwalk Co., Inc., South Norwalk, Conn.; compressor, air, electric, motor-driven 43,986
Okonite Co., Passaic, N. J.; cable, electric, insulated 428,699
cable, portable, underwater ... 14,532
Otis Steel Co., Cleveland; steel, sheet, full cold rolled, etc. 43,245
Peck, Stow & Wilcox Co., Southington, Conn.; shears, tinners'. 9,667
Phelps Dodge Copper Products Corp., Habirshaw Cable & Wire Div., New York; cable, electric, insulated 5,940
Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford; shaper, 12-inch, self contained, universal 8,103
Republic Steel Corp., Cleveland; steel, bar 46,991
rivets, steel 114,300
Rockbestos Products Corp., New Haven, Conn.; cable, electric .. 181,943
Rockford Machine Tool Co., Rockford, Ill.; shaper-planer, open-side, motor-driven 29,595
shapers, hydraulic 26,844
Justus Roe & Sons, Patchogue, N. Y.; tapes, measuring, steel 6,561
Romec Pump Co., Elyria, Ohio; units, portable, refueling 16,467
Service Supply Corp., Philadelphia; cranes, portable 6,327
Sharples Corp., Philadelphia; purifiers, oil, diesel, centrifugal type, complete 16,382
Sidney Machine Tool Co., Sidney, Ohio; lathes, engine 21,252
Sperry Gyroscope Co., Inc., Brooklyn; instruments 116,000
Star Electric Motor Co., Bloomfield, N. J.; sets, motor generator and spare parts 266,561
L. S. Starrett Co., Athol, Mass.; tapes, measuring, steel 29,346
Steel Conversion & Supply Co., Pittsburgh; blanks, chisel; chisels, pneumatic, machinists', hand 90,436
Tampa Shipbuilding Co., Inc., Tampa, Fla.; three destroyer tenders 40,257
Taylor Instrument Co., Rochester, N. Y.; manometers, aneroid ... 5,212
James L. Taylor Mfg. Co., Poughkeepsie, N. Y.; clamps, screw, quick adjusting, sliding head .. 9,682
S. G. Taylor Chain Co., Hammond, Ind.; chains and fittings 15,303
Troy Chain Co., Inc., New York; chains and fittings 7,872
Vibration Specialty Co., Philadelphia; machines, balancing 18,333
Walworth Co., Inc., New York; valves, steel, welded and springs, spares 366,024
Westinghouse Electric & Mfg. Co., Washington; two condensers .. 304,815
Baxter D. Whitney & Sons, Inc., Winchendon; machines, double surfacer 12,098
Wiedemann Machine Co., Philadelphia; machines, punching, turret, motor-driven 8,891
Woodhouse Chain Works, Trenton, N. J.; chains and fittings 117,015
Wooster Products, Inc., Wooster, Ohio; treads, safety, type B, aluminum alloy base, abrasive insertion 18,450
Yale & Towne Mfg. Co., Philadelphia Division, Philadelphia; trucks, electric, crane, revolving 19,221

War Dept., Ordnance:

Aetna Standard Engineering Co., Youngstown, Ohio; pilot top carriage $30,000
Allegheny Forging Co., Pittsburgh; rail forgings 6,120
Aluminum Co. of America, Cleveland; ingots 7,830
sheet aluminum 10,836

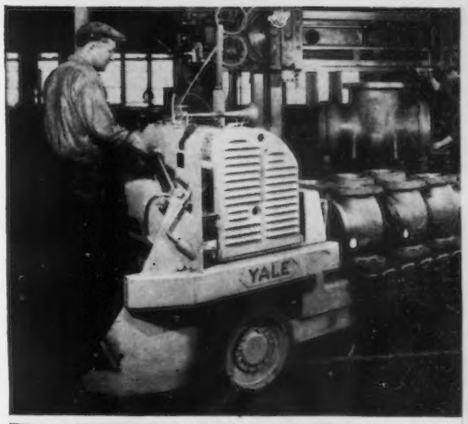
Many Steel Plants Top Rated Capacities

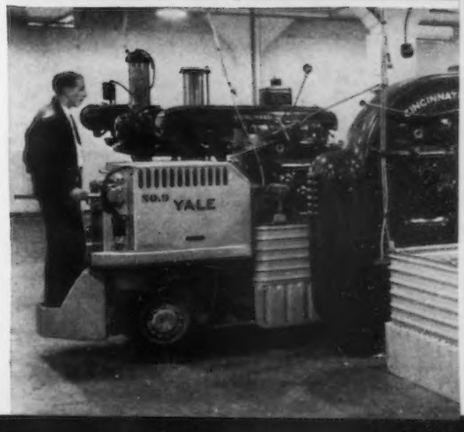
• • • Two-thirds of the 35 steel companies which report their operations weekly to the American Iron and Steel Institute, operated at capacity or higher in the first quarter. Rated capacity was equaled by six companies and exceeded by 17 others.

In the weeks when their output was above rated capacity, those 17 companies produced 9,040,000 tons of steel, or 3.3 per cent more than their rated capacity for those weeks.

Rated capacity of the steel industry is the sum total of the maximum output in recent years of each furnace in the industry—less a deduction averaging about 11 per cent to allow for time lost in shutdowns for repairs.

American Cutter & Engineering Co., Detroit; tools 16,515
Automotive Maintenance Machinery Co., North Chicago; tools .. 6,528
Belmont Iron Works, Philadelphia; steel work 15,356
Bendix Aviation Corp., Sidney, N. Y.; parts for tanks and combat cars and tools 28,075
Black & Decker Mfg. Co., Towson, Md.; portable grinders 5,185
Blackhawk Mfg. Co., Milwaukee; rams, hydraulic 10,916
Blanchard Machine Co., Cambridge, Mass.; surface grinders 7,350
Blaw-Knox Co., Union Steel Castings Div., Pittsburgh; hulls for tanks 31,000
Bonney Forge & Tool Works, Allentown, Pa.; wrenches 9,054
Bridesburg Engineering Co., Philadelphia; tools 19,434
Carnegie-Illinois Steel Corp., South Chicago; steel, bar 12,376
Chase Brass & Copper Co., Inc., Waterbury, Conn.; brass, hex. rod 29,623
Cincinnati Milling Machine Co., Cincinnati; milling machines .. 5,118
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati; small tool grinders 6,060
Commercial Shearing & Stamping Co., Youngstown, Ohio; plates, end 10,860
Continental Motors Corp., Muskegon, Mich.; tools 13,855
Arthur A. Crafts Co., Inc., Boston; gages 9,720
C. R. Daniels, Inc., New York; cases 10,905
Doehler Die Casting Co., Pottstown, Pa.; ogives, for fuze ... 20,684
James C. Doran & Sons, Inc., Providence; cups, booster and supports, plunger 38,335
E. I. du Pont de Nemours & Co., Pompton Lakes, N. J.; lead azide 270,000
Eaton Mfg. Co., Stamping Division, Cleveland; cups, detonator 28,515
Ever Tite Mfg. Co., Davenport, Iowa; cleaning rods 22,033
General Motors Sales Corp., New Departure Division, Bristol, Conn.; bearings 18,815
Gleason Works, Rochester, N. Y.; machines 17,444





YALE ELECTRIC TRUCKS CUT COSTS, SPEED HANDLING FOR INDUSTRY

Executives know the answer to the speed-up demanded by the National Defense Program. That answer is modernized materials handling—the elimination of waste time, the lowering of handling costs.

All of these may be accomplished by the right kind of materials handling equipment. Yale Electric Industrial Trucks are such equipment. They do more work in less time, maintain the flow of materials, are safer, require less time out for maintenance, cut handling costs.

Executives are buying more Yale Electric Trucks because they get more ton miles per handling dollar. Operators like them, too. They find they are safer, have greater visibility and are easier to operate.

Find out about this Yale line of Electric Trucks. There is a type for your every handling need. Call in your nearest Yale representative. Ask him to show you how Yale Electric Trucks can speed your operations, cut your costs. Or, write to us for full information.

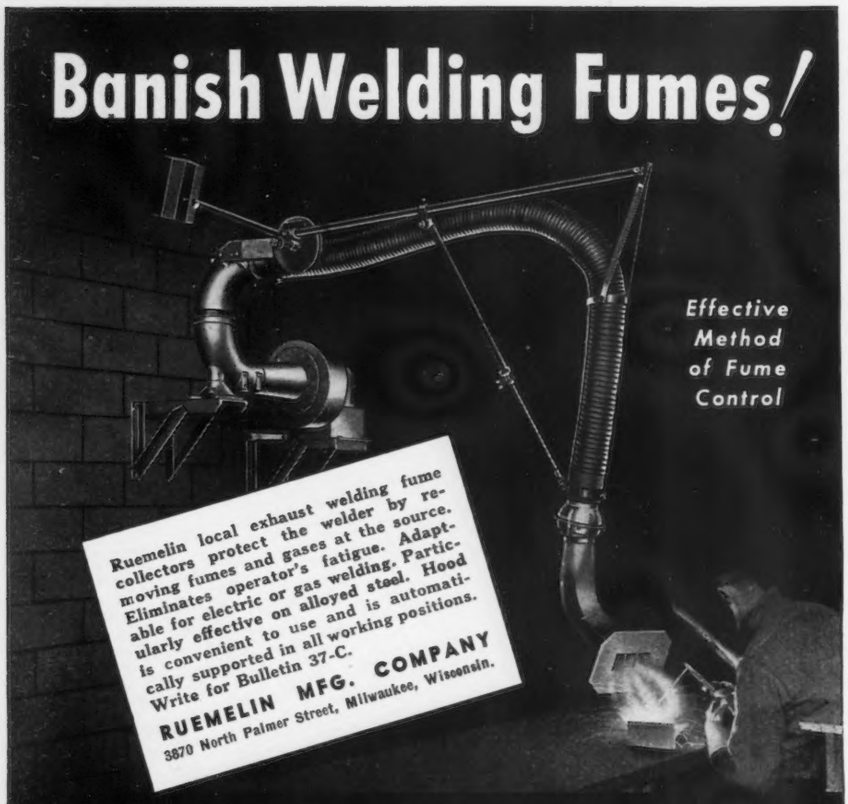
THE YALE & TOWNE MANUFACTURING CO.

PHILADELPHIA DIVISION—PHILADELPHIA, PA., U. S. A. **IN CANADA: ST. CATHARINES, ONT.**

TRADE YALE MARK

World's oldest and largest makers of Materials Handling Equipment, including Hand and Electric Hoists, Hand Lift Trucks, Electric Industrial Trucks and Tractors, Skid Platforms, and allied products.

Banish Welding Fumes!


Effective Method of Fume Control
Ruemelin local exhaust welding fume collectors protect the welder by removing fumes and gases at the source. Eliminates operator's fatigue. Adaptable for electric or gas welding. Particularly effective on alloyed steel. Hood is convenient to use and is automatically supported in all working positions. Write for Bulletin 37-C.
RUEMELIN MFG. COMPANY
3870 North Palmer Street, Milwaukee, Wisconsin.

RUEMELIN FUME COLLECTOR

GUSHER COOLANT PUMP

Every Tool Engineer Recognizes

Every tool engineer recognizes the coolant pump as an important part of his tooling-up plans.

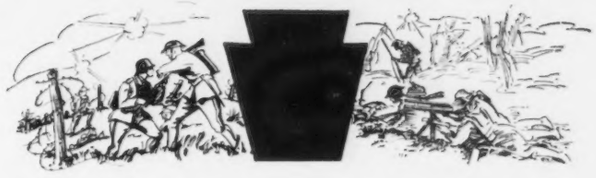
Many tool engineers prefer Ruthman Gusher Coolant Pumps because these pumps need no priming and are ready to deliver the desired volume at the snap of the switch. There are no packings to fuss with, and grit cannot clog the Gusher impeller Coolant Pump. That means there will be no interruption in production so far as coolant supply is concerned.

The RUTHMAN Machinery Company
CINCINNATI, OHIO, U.S.A.

Harding Machine Screw Co., East Liberty, Ohio; housings, primer, and screws, detonator	94,040
R. Hoe & Co., New York; artillery materiel	97,697
Independent Lock Co., Fitchburg, Mass.; housings for fuze	11,655
Walter Kidde & Co., Inc., Bloomfield, N. J.; recharge pumps	6,785
Liberty Tool & Gage Works, Inc., Providence; gages	11,563
Lite Mfg. Co., New York; machine gun covers	81,334
Magnaflux Corp., Chicago; demagnetizers	5,665
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.; gages, pressure	19,560
Morris Truck & Wheel Co., Inc., Philadelphia; trucks, steel	5,190
Niles-Bement-Pond Co., Pratt & Whitney Division, West Hartford; chambering machines	28,995
drills	30,930
Norton Co., Worcester; plain grinders	20,342
Peerless Tool & Engineering Co., Chicago; gages	15,380
Precision Mfg. Co., New York; gages	11,058
Quality Tool & Die Co., Indianapolis; gages	6,605
Republic Steel Corp., Massillon, Ohio; steel, hot rolled	20,293
blanks, barrel	22,256
Rivett Lathe & Grinder, Inc., Boston; bench lathes	118,236
Roessler Machine Co., Elkins Park, Pa.; tools	37,991
George Rutledge Co., Montclair, N. J.; fin assemblies	6,793
SKF Industries, Inc., Philadelphia; bearings	7,846
Scovill Mfg. Co., Waterbury, Conn.; detonator retainers	8,015
Seneca Falls Machine Co., Seneca Falls, N. Y.; lathes	42,275
Standard Alloy Co., Cleveland; baskets, pickling	8,080
Standard Gage Co., Poughkeepsie, N. Y.; gages	15,438
Stedfast & Roulston, Inc., Boston; machines, drilling	23,040
Sullivan Machinery Co., Michigan City, Ind.; air compressors	12,469
Swind Machinery Co., Milwaukee; machines, milling	8,220
Taft-Peirce Mfg. Co., Woonsocket, R. I.; gages	7,425
Talon, Inc., Meadville, Pa.; gages	8,186
Timken-Detroit Axle Co., Detroit; limbers	8,629
Tools & Gages, Inc., Cleveland; gages	15,378
Torq Electric Mfg. Co., Cleveland; attachments, motor drive	8,323
Tuthill Pump Co., Chicago; shells	196,140
Union Hardware Co., Torrington, Conn.; rods, rifle cleaning	10,762
United Aircraft Products, Dayton, Ohio; valve assys.	5,379
Van Norman Machine Tool Co., Springfield, Mass.; milling machines	85,805
Veit & Young, Philadelphia; tools	30,300
Vulcan Mold & Iron Co., Latrobe; molds, chill	32,913
Western Machine Tool Works, Holland, Mich.; shapers	36,058
White Motor Co., Cleveland; parts for scout car	38,788
Zimmerman Steel Co., Bettendorf, Iowa; castings, steel	6,456
War Dept., Other Agencies:	
Aluminum Co. of America, Washington; aluminum foil	$165,563
American Monorail Co., Cleveland; metal shapes, cranes, hoists, etc.	318,182
American Type Founders Sales Corp., Washington; presses, rotary	16,661
Baldwin Southwark Division, Baldwin Locomotive Works, Eddystone, Pa.; testing machines	6,070

Bendix Aviation Corp., Pioneer Instrument Div., Bendix, N. J.; meter assys. 111,402
Biggs Boiler Works Co., Akron, Ohio; low pressure chambers .. 29,466
Black Hawk Mfg. Co., Milwaukee; jack assys. 69,120
Blackmer Pump Co., Grand Rapids, Mich.; fuel transfer pumps 60,000
Bucyrus-Erie Co., South Milwaukee; machines, well drilling ... 9,015
cranes 27,020
Carey Machinery & Supply Co., South Bend, Ind.; lathes, bench 9,913
J. I. Case Co., Racine, Wis.; tractor mowers 165,660
Caterpillar Tractor Co., Peoria, Ill.; tractors 9,201
Champion Spark Plug Co., Toledo, Ohio; spark plugs 1,419,004
Chandler-Evans Corp., South Meriden, Conn.; maintenance parts. 132,610
Comper Mfg. Co., Pittsfield, Mass.; orthopedic and x-ray tables 32,769
Continental Can Co., St. Louis, Mo.; cans, filter discs 6,898
Continental Electric Co., Inc., Newark; power plants 154,998
Crosley Corp., Cincinnati; cabinets and fire units 11,534
Curtiss-Wright Corp., Buffalo; additional machinery and equipment and plant improvements .. 4,603,494
Curtiss-Wright Corp., Curtiss Propeller Div., Caldwell, N. J.; blade assys. 147,434
Dietrich Brothers, Inc., Baltimore; furnishing and erecting structural steel 54,000
Eugene Dietzgen Co., Chicago; blueprint filing sections 68,727
compasses and dividers 105,125
Douglas Aircraft Co., Inc., Santa Monica, Cal.; airplanes and parts 43,521
Edgewater Steel Co., Pittsburgh; adapter assys. 158,492
Emmerich Schmid, Inc., Indianapolis; nasal turbinate knives ... 29,780
Fairchild Aviation Corp., Jamaica, N. Y.; computer assys. 472,479
Forsythe Equipment Co., Inc., Long Island City, N. Y.; speederane and generator 17,173
Fruehauf Trailer Co., Kansas City, Kan.; trailers 4,286,506
General Electric Co., Schenectady; miscellaneous parts and assys... 58,918
General Motors Corp., A.C. Spark Plug Division, Flint, Mich.; spark plugs 1,149,987
General Motors Corp., Allison Division, Indianapolis; engines 96,016
Goodyear Tire & Rubber Co., Akron, Ohio; wheel and brake assys. 822,510
Hanson-Whitney Machine Co., Hartford; gages, pipe 57,832
Hayes Industries, Inc., Jackson, Mich.; wheel and brake assys.. 145,169
Hobart Brothers Co., Troy, Ohio; welding outfits 8,193
Howe Scale Co., Rutland, Vt.; physicians' scales 8,379
Hubbard & Floyd, Inc., New York; trailers 9,060
Jacobs Aircraft Engine Co., Pottstown, Pa.; parts for engines .. 110,177
Knox Stove Works, Knoxville; griddles, cast iron 7,000
Legion Utensil Corp., Long Island City; mess equipment 24,906
R. G. LeTourneau, Inc., Peoria, Ill.; carryalls 74,416
Lindberg Eng. Co., Chicago; electric furnaces 77,504
Lufkin Rule Co., Saginaw, Mich.; gages 63,540
Lyon Metal Products, Inc., Aurora, Ill.; steel shelving 88,895
P. R. Mallory & Co., Indianapolis; shackle releases 85,800
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.; gage assys... 27,700

SYMBOLS of DEFENSE



A RED KEYSTONE is the symbol worn by the men of the 28th Division, Pennsylvania National Guard, now in training at the camp just completed at Indiantown Gap, Pennsylvania. Here, under the leadership of Major General Edward Martin, they are being molded into a fighting outfit which will carry on the fine traditions of the Division.

In France during World War I the men from the Iron Division, as it was called, fought on five fronts. At Chateau Thierry, Baslieux and in the Forest of the Argonne they repeatedly formed an effective spearhead of the American advance.

During their service of 102 days in the front line they lost 14,139 men killed and wounded.

SPEARHEAD of American defense industries in their fight against corrosion is this famous "18 and 8" Columbium bearing alloy of the Lebanon Steel Foundry. With a carbon maximum of only .07, readily obtained by Lebanon's modern induction type furnaces, its Columbium content is ten times carbon. Circle L 21 is particularly suitable for use in welded assemblies because subsequent heat-treatment is not necessary to prevent corrosion at the welds. Circle L 21 meets the U. S. Navy's specific corrosion requirements, in accordance with Specification 46-S-27 Grade 1 Welding.

LEBANON STEEL FOUNDRY • LEBANON, PA.

ORIGINAL AMERICAN LICENSEE GEORGE FISCHER (SWISS CHAMOTTE) METHOD

LEBANON *Stainless and Special Alloy* STEEL CASTINGS

'40 Steel Earnings Highest Since '29

• • • **Steel industry earnings** in 1940 were the highest of any year since 1929, but were 40 per cent lower than in that year, although output was 6 per cent greater.

In 1940 companies in the steel industry representing over 90 per cent of the industry's steelmaking capacity earned a total of $281,080,000 after meeting all charges but before paying dividends, according to reports compiled by the American Iron and Steel Institute. In 1929, the industry earned a total of nearly $455,000,000 while in 1939, steel company earnings totaled $147,468,000.

Taxes paid by the industry last year totaled $225,160,000, an increase of 57.5 per cent over the total of nearly $143,000,000 paid in 1939. Comparison of the taxes paid by an identical group of major steel companies over the past twelve years shows that in 1940 taxes paid per ton of finished steel produced were nearly 80 per cent above 1929.

Dividends paid to steel companies stockholders in 1940 were equal to 11.7 cents for each dollar going into payrolls, compared with 7.4 cents in 1939.

21 Steel Companies' Earnings in First Quarter Considerably Above Same Period 1940

	1st Quarter, 1941	4th Quarter, 1940	1st Quarter, 1940	Year 1940	Year 1939
United States Steel Corp.	$36,559,995	$32,793,212	$17,113,995	$102,211,282	$41,119,934
Bethlehem Steel Corp.	10,436,028	14,516,779	10,891,139	48,677,524	24,638,384
Republic Steel Corp.	8,189,966	8,480,174	3,111,723	21,113,507	10,671,343
National Steel Corp.	5,430,398	6,271,187	4,009,193	15,066,341	12,581,636
Youngstown Sheet & Tube Co.	4,576,197	5,549,976	1,253,929	10,815,468	5,004,484
Inland Steel Co.	4,555,118	4,561,901	3,059,844	14,450,385	10,931,016
Jones & Laughlin Steel Corp.	4,160,507	4,044,126	1,134,611	10,277,029	3,188,944
American Rolling Mill Co.	3,599,241	3,753,604	1,005,194	7,642,714	4,011,909
Crucible Steel Co. of America	3,044,270	2,859,682†	1,193,156	6,230,180	2,803,596
Allegheny Ludlum Steel Corp.	2,720,164	1,591,954	966,598	3,722,107	2,093,518
Wheeling Steel Corp.	1,981,009	2,388,744	644,652	5,685,848	5,560,753
Colorado Fuel & Iron Corp.	1,141,756	320,064	564,927	1,744,869	57,564
Acme Steel Co.	963,474	479,352	384,254	2,127,444	1,908,609
Pittsburgh Steel Co.	889,700	710,361	203,008	1,555,795	564,870
Rustless Iron & Steel Corp.	761,697	456,609	213,126	1,275,993	1,090,876
Otis Steel Co.	594,183	614,485	165,513*	717,007	214,965
Sharon Steel Corp.	527,253	581,944	309,576	1,336,822	255,497
Keystone Steel & Wire Co.	410,137	288,966	279,386	1,418,221	897,299
Continental Steel Corp.	313,122	286,631	211,456	778,738	1,208,200
Wickwire Spencer Steel Co.	231,172†	250,651†	262,701	64,659*	233,358*
Granite City Steel Co.	93,195	213,234	43,152	315,259	347,940

*Loss. †Before all taxes.

UNAMATIC PROCESS
SELF PROPELLING
Carriage for Longer Butt and Lapwelds
Designed originally for arc welding of long pipe sections.
The Una Tractor Carriage is being successfully applied to welding such miscellaneous assemblies as Freight Car Center Sills, Bridge Decks, Structural Shapes and Sections, Pressure Vessels, Ship Plate, Crane Girders, Hard Surfacing Rail Sections, etc.
The Una Tractor unit carries the complete assembly necessary for welding long seams with the exception of the Power unit. It is easily handled. It has only three cable connections to power lines for complete application. It is self-propelling with heavy duty motor, with variable speed transmission for complete speed range.
Ask for complete information.
UNA WELDING, Inc.
1615 COLLAMER AVENUE
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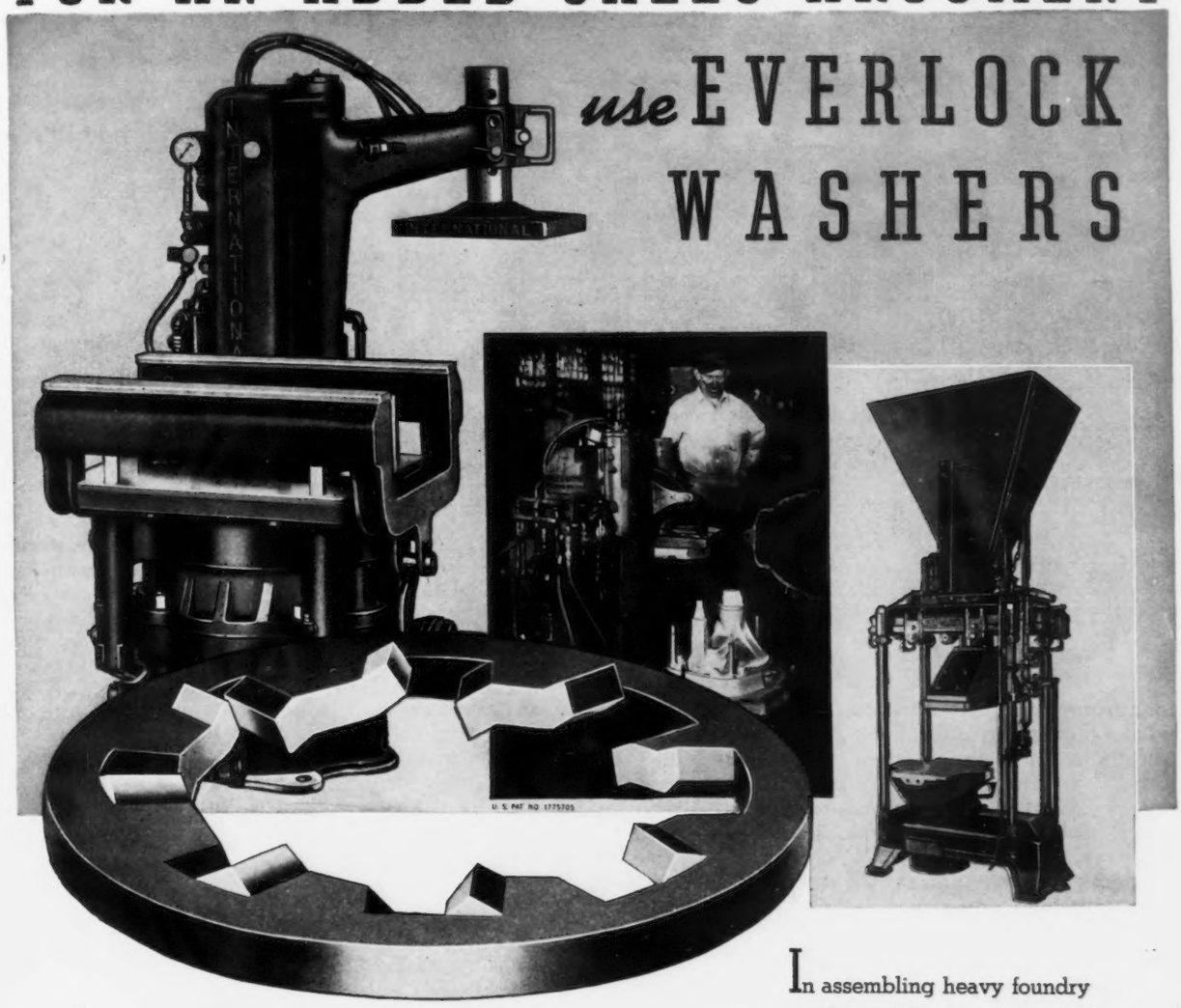
UNA
UNAMATIC
PROTECTED ARC
WELDING
FOR MILD, MEDIUM, HIGH CARBON AND STAINLESS STEELS, ALLOYS AND NON-FERROUS METALS
BETTER — AND FROM 3 TO 4 TIMES FASTER THAN MANUAL WELDING

FOR AN ADDED SALES ARGUMENT

use EVERLOCK WASHERS



Washer Tongue Detail

In assembling heavy foundry machines, like those pictured, the International Molding Machine Company of Chicago use EVERLOCK WASHERS to stop loosening of nuts, bolts and screws . . . These massive, powerful machines are subjected to severe shocks and vibration. The core blower, pictured at the right, sets up a terrific vibration on the hopper while in use due to its action of two thousand motions per minute . . . The molding machine, pictured at the left and in the center, has a constant jolting action while in motion. The table is raised three inches and slammed down 150 times every minute . . . On this table 600 pounds or more of sand, including flask, is held rigidly in place . . . EVERLOCK WASHERS play a vital role in holding the many parts of these machines together . . . The International Molding Machine Company know that EVERLOCK WASHERS do the job more satisfactorily than any other locking devices . . . Look to EVERLOCK WASHERS for the solution of your lock washer problems . . . Listen to the enthusiastic praises of the users of EVERLOCK WASHERS and profit by their experience . . . There is an EVERLOCK WASHER of the correct size and type for every purpose.

Immediate Deliveries

OFTEN OTHER WASHERS HAVE BEEN TRIED, NOW EVERLOCKS ARE SPECIFIED

THOMPSON-BREMER & CO. 1638 W. HUBBARD ST., CHICAGO, ILL.

PRINTED IN U.S.A.

Faster CLEANING MEANS *Faster* SHIPMENTS. . .KEEP YOUR CUSTOMERS *Satisfied* WITH

WHEELABRATOR *Speed* CLEANING

CENTRIFUGAL FUSING CO.
Lansing, Michigan
(Using three Wheelabrator Cabinets for Cleaning Brake Drums)
Says: "No other method could give us the production and quality which we must maintain day after day. In 1940 we shipped slightly over five million drums."

WHEN the customer tears his hair and would like to tear yours, too, because castings are not delievered on schedule, where does the trouble lie? More often than not it can be traced to tie-ups in the cleaning room. Just what is the solution to the problem? Certainly it is not to be found in man power. And certainly not by adding more space-taking machines of a type you've already found to be a drag on production. What will help tremendously, however, is to do what hundreds of others have done when faced with the same problem, and that is to install airless WHEELABRATOR speed-cleaning equipment. Read the comments of a few of these users below.

THE PRIZER-PAINTER STOVE WORKS
Reading, Pa.
(Using a No. 3 Wheelabrator Multi-Tablast)
Says: "The volume of production greatly surpasses the former method of sand blasting, which automatically results in a comparatively lower cleaning cost per pound."

HARTFORD ELECTRIC STEEL CORP.
Hartford, Conn.
(Using a 48" x 48" Wheelabrator Tumblas.)
Says: "Our actual operating time has been cut to 2½ to 3 hours, with better and more consistent looking castings, and our time of the Sand Blast room has been cut from 24 hours to 8 hours.

BENTON HARBOR MALLEABLE INDUSTRIES
Benton Harbor, Mich.
(Using a 36" x 42" Wheelabrator Tumblast)
Says: "It has reduced cleaning time approximately 50% and we estimate we are saving 300 cu. ft. of air per minute."

ACCURATE STEEL TREATING CO.
Chicago, Illinois
Says: "Formerly we had a man on each shift who handled nothing but shot blasting. Now we do not have a man assigned to this particular work. We find that we can handle it readily enough in the spare time of operators on other work.

NATIONAL SEWING MACHINE CO.
Belvidere, Illinois
Says: "Your machine does a wonderful job of cleaning and does it in an unbelievable short time. We are able to ship to our customers a day earlier on account of the time saved."

TRADE MARK
THE AMERICAN MOLDER

AMERICAN FOUNDRY EQUIPMENT CO.
510 S. BYRKIT ST. MISHAWAKA, IND.

Inland Official Notes Post-War Danger To Steel As Public Utility

Chicago

• • • **Clarence B. Randall, vice-president of Inland Steel Co., declares that the steel industry's greatest peril is in the danger that after the war there may be a tendency to place the industry in the class of a public utility. The Inland official spoke to the American Mining & Metallurgical Engineers here.**

Baldwin Farms Out Contracts at Pittsburgh

• • • **The Baldwin Locomotive** Works, Philadelphia, began negotions last week with local manufacturers here for production on $15,000,000 of subcontracts. Thirty-three companies are undertaking to produce the Baldwin contracts and additional orders may be forthcoming for other manufacturers.

Missouri Plant To Make 15 Combat Tanks a Day

St. Charles, Mo.

• • • **Daily output of** 15 combat tanks will soon be coming from the local plant of American Car & Foundry Co. here. About 1000 tanks are scheduled for production. Tanks will weigh 12½ tons and will be speedy vehicles. Armor plate for these tanks will be produced in the company's plant at Berwick, Pa.

Illinois Wage Law Shelved

• • • **Minimum wage - maximum** hour legislation for Illinois has been shelved amid a protest from labor. The proposed 40 hr. work week, with minimum hourly wage of 30c. until Sept. 30, 1945, and 40c. an hour thereafter was shoved aside by a 7-3 vote of the industrial affairs committee. Reuben G. Soderstrom, Illinois Federation of Labor president, accused Governor Green of not fulfilling his pledge to "aid labor." Victor A. Olander, secretary of the Illinois Federation of Labor called the action "a crack down against the common people."

78 New Chicago Plant Projects In 30 Days

Chicago

• • • **With 78 industrial building projects started in the last 30 days, capital investment in new manufacturing facilities in the Chicago area was more than four and one half times larger than in the corresponding period of 1940. The 78 new plants or additions will cost $16,415,000. Twenty three of the expansions are based on federal certificates of necessity, indicating the part rearmament is playing. During the first four months of the year, nine new industrial companies have started up here and 196 firms expanded facilities. Exactly 53 companies have obtained certificates of necessity since the first of the year, their moves being valued at $110,469,000.**

Contracts Awarded For New Iron Mine

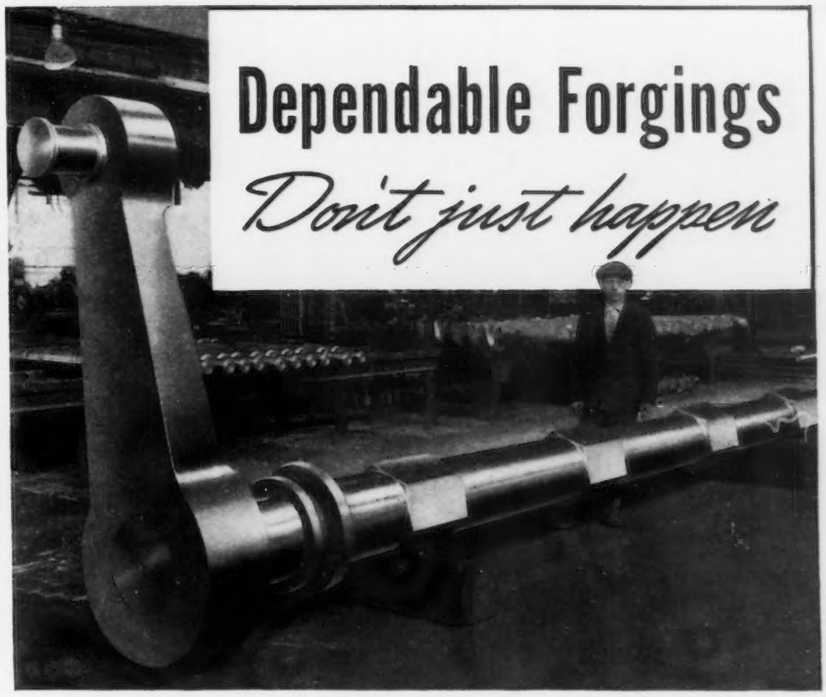
Ishpeming, Mich.

• • • **Construction will be started** May 1 on a modern $250,000 layout providing ground facilities for the new iron mine now being developed two miles northeast of here by the Negaunee Mine Co., which is owned jointly by the Cleveland-Cliffs Iron Co. and Bethlehem Steel Co. Contracts for design and construction of the building have been awarded to the Austin Co.

Four main buildings are included in the interconnecting ground layout which includes a 90-ft. covered passageway to the mine elevator platform. Power machinery required to operate the mine will be housed in a two-story engine house, 60 ft. x 241 ft.

The mine shaft is at present being developed to a depth of approximately 3000 ft. and will be deepened as conditions warrant. Ore will be hoisted in two skips having a capacity of 12 tons of ore each, which will be operated in balance. A double deck cate is being provided to transport men to the working areas and will be capable of accommodating 75 men per trip.

The steel headframe of the shaft will extend 200 ft. above ground level. This will be equipped with a passenger elevator to take men to the stocking trestle platform and various other points for maintenance work.



Breakdowns, delays and frequent replacements are expensive. Dependable forgings that will minimize these troubles and give the utmost in service are a real economy. These are the forgings that Standard offers you.

The high quality and dependability of Standard's forgings are the result of years of experience. Standard's expert engineering starts with the selection of raw materials for its own open-hearth furnaces. It embraces the supervision of every step in manufacture.

Are you taking advantage of the dependability and economy of Standard's forgings?

CASTINGS • FORGINGS • WELDLESS RINGS • WROUGHT STEEL WHEELS

BLW THE BALDWIN GROUP

STANDARD STEEL WORKS

Division of THE BALDWIN LOCOMOTIVE WORKS
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BALDWIN SOUTHWARK DIVISION • THE PELTON WATER WHEEL COMPANY
BALDWIN DE LA VERGNE SALES CORP. • THE WHITCOMB LOCOMOTIVE COMPANY
THE MIDVALE COMPANY • CRAMP BRASS AND IRON FOUNDRIES DIVISION

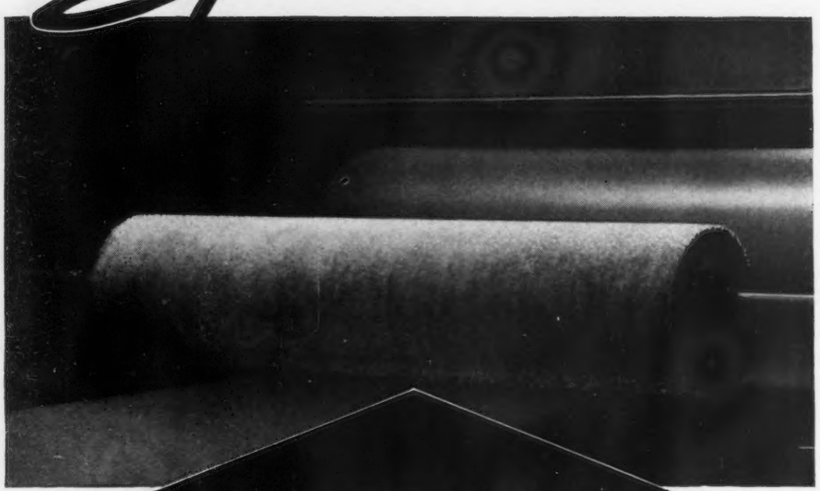
Subcontract To Speed Defense, OPM Warns

• • • Subcontracting must be spread throughout industry to avoid a "criminal delay" in production of weapons the nation urgently requires, John D. Biggers, OPM Director of production, told the U. S. Chamber of Commerce.

"Two things must be done," Mr. Biggers said in an address at New York on April 30. "The first is for these prime contractors to find and develop and train competent subcontractors who can relieve them of part of the ever increasing load.

"The second thing that must be done—and I assure you it will be done—in this spread-the-work program is to place many new contracts with competent prime contractors who will assume responsibility for assembly work and will then farm out most or even all of the manufacturing job to subcontractors."

Speed up!



THESE SPIRAL WOUND BRUSHES WILL HELP YOU DO IT!

●Install Pittsburgh Plate Glass Company's Spiral Wound Brushes on your continuous strip production line. They'll help *two* ways! *First:* They'll cut finishing *time* for light guage steel and tin plate.
Second: They'll cut finishing *costs* and help you turn out a better job.
Investigate! "Pittsburgh" Spiral Wound Brushes are available in various fills—nickel silver wire, horsehair and tampico.
Consult with our engineering represntatives. They will gladly work with you in developing special brushes to meet your particular finishing requirements. Write or telephone today, and let us know what your specific problem is—no obligation.

PITTSBURGH
PLATE GLASS COMPANY
BRUSH DIVISION · BALTIMORE, MD.

New Indiana Powder Plant Can Supply Army of 1,000,000

Charleston, Ind.

• • • Exactly 23 days ahead of schedule, the world's largest powder plant started production on April 24, when the first of six lines were put in operation. Production was started without waiting for completion of the entire building, which will cost $86,548,000. Each line will turn out 100,000 lb. of powder per day. In full operation, the plant will employ about 10,000; it is controlled by E. I. DuPont De Nemours, Inc. May 17 deadline for opening the plant was beaten by expanding construction force in the last few weeks to a high of 26,756 workers. Ground was broken Sept. 2, after the contract was awarded to DuPont on July 17.

According to Lieut. Col. R. E. Hardy, construction and operating officer, the powder plant in full production can supply an army of 1,000,000.

Nearby this plant, another factory will be manufacturing the rubberized bags in which the explosives will be shipped. The bag-loading plant will employ 6500.

100 Subcontractors Get Westinghouse Orders

Pittsburgh

• • • In an effort to speed emergency work, Westinghouse Electric & Mfg. Co. has to date "farmed out" approximately $10,000,000 of defense contracts which have been spread among more than 100 companies. Largest single subcontract was a $2,600,000 order for reduction gears to be used in propulsion equipment for destroyers, according to A. H. Phelps, general manager of purchases and traffic.

Dues Collectors Turn Back Carnegie Workers

• • • Dues collecting drives at the Ohio Works and McDonald plant of Carnegie-Illinois Steel Corp. were vigorous last week. Scores of workers were turned away from work by card-checking pickets. Many men, however, paid up and returned to work. Union officials told McDonald police that the checking system is to become a monthly procedure.

N.M.T.A. Convention Hears Col. Johnson

• • • **Col. Louis Johnson,** former assistant secretary of war, was to speak on "The Job Ahead," and Leon Turrou, formerly of the Federal Bureau of Investigation, was to deliver an address on "Fighting America's Fifth Column" at the National Metal Trades Association's annual convention May 8-9 at the Palmer House, Chicago.

The association's nominating committee recommended for president A. H. Timmerman, Wagner Electric Co., St. Louis, Mo.; vice president, Roe S. Clark, Package Machinery Co., Springfield, Mass.; second vice president and treasurer, H. H. Kerr, Boston Gear Works, Inc., North Quincy, Mass.

Today's (May 8) program includes addresses on "Priorities" by Dr. S. S. Stratton, assistant director of minerals and metals of the OPM Priorities Division, and on "A Branch Program of Production Control," by C. G. Kopplin, production manager, Union Special Machine Co. Friday's program at the metal trade association's convention will include talks on labor training and other subjects.

Die-Typing Corp. Organized at Detroit

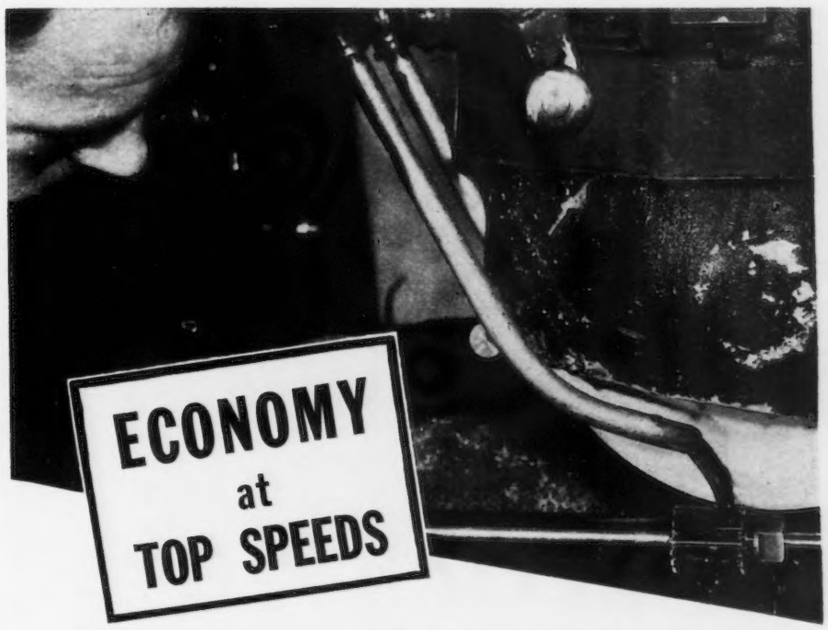
• • • **Incorporation** of the Die-Typing Corp., Detroit, for the manufacture and sale of dies made by patented methods has been announced. The organization will make use of die typing methods that have been employed for more than a decade by one of the major automobile builders under license. The method permits the inexpensive fabrication of many duplicate dies from a single master die (see THE IRON AGE, March 17, 1932).

Officers of the new organization include William F. Weed, president; Brewster Loud, Jr., of Campbell-Ewald Co., vice-president; Lawrence S. Roehm, of Jones & Laughlin Steel Co., vice-president; Jules G. Hoffman, secretary-treasurer; Henry E. Beyster, former General Motors Corp. executive, and now president of H. E. Beyster Corp., is one of the directors of the new company, along with Mr. Weed and Mr. Loud.

Packard Electric Strike Threatens Defense Orders

Warren, Ohio

• • • **The Packard Electric Division** of General Motors Corp. was tied up starting May 1 after two departments adopted slow-down tactics and the corporation issued pass-out slips. Around 1700 workers were affected by the strike. B. N. MacGregor, factory manager, charged the slow-down Wednesday, April 30, had threatened general defense orders. The Packard Division makes wiring equipment for aircraft, tanks, tractors and trucks. According to union officials the slow-downs were the union's protest against failure of the management to reach an agreement on grievances cited April 6.



Can the oil in your machines stand up under the top running speeds of today's high pressure work? When cutting and grinding operations are carried on at close to the maximum output of your machines, do you find your oil costs increasing? Do you get the same quality finish?

Cities Service Service Proved Oils are made to take it at high production speeds. These oils, with years of actual use-in-plant experience behind them, will give you more in the way of increased production, lower costs and better finish.

HEAT PROVER SERVICE

Many plants have found Heat Prover Service invaluable in saving on fuel and in regulation of atmospheres in heat-treating furnaces. Our lubrication representative will tell you how you can get this free service. He also will be glad to help you with your lubrication problems. We have available a folder entitled, "Metal Cutting Lubrication." Send in coupon if you wish a copy.

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Please send me Booklet on Metal Cutting Lubrication. ☐

Please have representative call and explain Heat Prover Service. ☐

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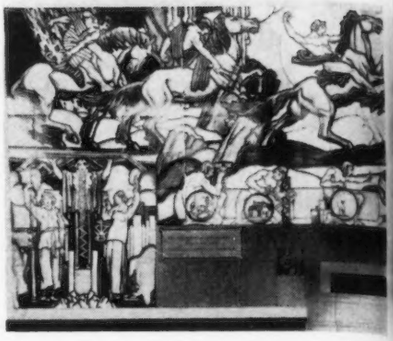
Bishop Becomes Special Assistant to Henderson

Washington

• • • **Charles A. Bishop,** who as a member of the Defense Commission's Price Stabilization Division was credited with working out the scrap iron and steel price schedules, has been named special assistant to Price Administrator Leon Henderson. For the time being, Mr. Bishop will work in the price division of OPACS, although Mr. Henderson indicated his future assignment would cover "major problems" coming before OPACS.

Mr. Bishop came to Washington from the Pennsylvania Economy League and formerly was assistant to W. F. Merrill, president of the Remington Rand Co.

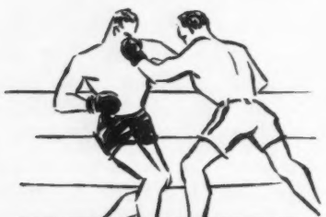


THIS LARGEST MURAL ever taken to Cleveland from the slowly The mural, depicting "Man's executed by Daniel Bonza, of of that city.

Thicknesses from 1/64" to ¼". Sheets 40" x 40" and larger.

GARLOCK 7021

will take plenty of punishment!



Under the most severe conditions —such as super-heated high pressure steam and light oils at high temperatures — Garlock 7021 Compressed Asbestos Sheet Packing will *stand up* where ordinary gasketing materials fail. Avoid gasket failures and expensive shut-downs — use Garlock 7021.

THE GARLOCK PACKING COMPANY
PALMYRA, N. Y.
In Canada: The Garlock Packing Co. of Canada Ltd., Montreal, Que.

GARLOCK

Trade Notes

Scully-Jones & Co., 1901 South Rockwell Street, Chicago, are now manufacturing and selling Power Sprue cutters formerly supplied by Tessmer Machine & Tool Co., Detroit.

•

Dow & Co., Buffalo, have been appointed distributers for Bucyrus-Erie ⅜-yd. to 2½-yd. shovels, draglines, clamshell and lifting cranes. They will cover an extensive territory in northwestern New York.

•

Atlantic Instrument & Tool Co., Inc., 418 Broome Street, New York, has been organized for the manufacture of precision measuring instruments, adjustable snap gauges and other tools.

•

Cutler-Hammer, Inc., pioneer manufacturers of electric control equipment, has established a warehouse at 131 Clarendon Street, Boston, Mass.

•

Free license on the use of its DBL type of low-tungsten high speed steel has been granted by the Allegheny Ludlum Steel Corp., Pittsburgh, to the Columbia Tool Steel Co., Chicago Heights, Ill.

•

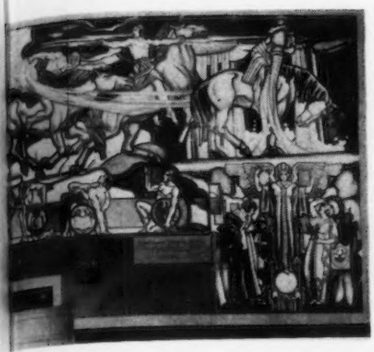
Star Mfg. Co., New Lexington, Ohio, has been purchased by the Dayton Steel Foundry Co. It is understood the plant will be placed in operation soon on the manufacture of brake drums.

•

Ampco Metal, Inc., Milwaukee, producer of alloys of the aluminum bronze class, has placed Sherman Barnes in charge of its western New York sales territory. He will make his headquarters at 239 Burr Street, Rochester, N. Y.

•

Keego Die Casting Co., Keego Harbor, Mich., has been incorporated to deal in tools and dies. Capitalization is announced at $50,000.



executed in porcelain enamel has been disappearing World's Fair buildings. Struggle Against the Elements," was Cleveland, for the Ferro Enamel Corp.

Mill River Tool Co., Springfield, Mass., formerly located at plants in South Main and Cass Streets, is now at 338 Worthington Street, Springfield. The company is engaged in making tools, gages, jigs and fixtures for guns. A. L. Bausman, formerly with the National Equipment Co., is general manager.

•

Chicago offices of Koppers Coal Co. and the Bartlett Hayward & Wood Preserving divisions of Koppers Co. will be consolidated about May 1, it is announced by Walter Rothenhoefer, general manager of sales for the coal company. The new offices are in the Railway Exchange Building, 224 South Michigan Avenue.

•

Dirats Mfg. Co., Westfield, Mass., is constructing a manufacturing plant on the former Socony-Vacuum Oil Co., North Elm and Notre Dame Streets, Westfield property, and expects to get into production of precision grinding wheels in June.

•

J. R. Lafayette, Redboiling Springs, Macon County, Tenn., is at head of project to install and operate local pressure pipe line system for natural gas distribution, including welded steel pipe line for connection with supply source, meter and control house, and other operating facilities.

•

Eastern Tool & Mfg. Co., 129-147 Bloomfield Avenue, Bloomfield, N. J., will close its plant for a week's vacation beginning June 28.

•

Detroit Ball Bearing Co., 101 W. Alexandrine Avenue, Detroit, has established a branch at 127 South Water Street, Saginaw, Mich. W. C. Thompson is manager.

•

Milwaukee Tool & Die Co., Milwaukee, has been organized by F. A. Dean, W. J. Steil and Fred Busch with Corrigan & Backus serving as attorneys, 735 N. Water St.

Youngstown Industry Faced With Shortage of Water

Youngstown

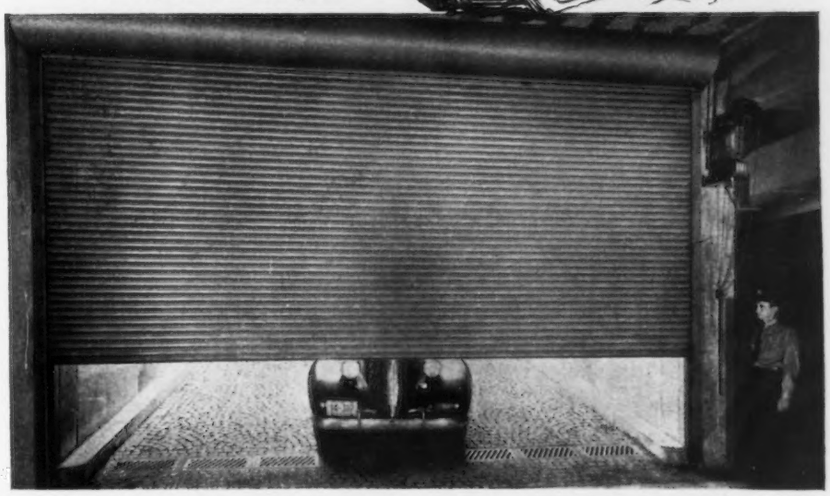
• • • **On the heels** of the coal shortage, industries of the Mahoning Valley are facing a critical water supply situation.

The dryest April in 26 years has reduced all sources of water supply. Last week the water level at Lake Milton, large reservoir, was 14¼ ft. below the spillway and the lake held only a little more than one-third of capacity.

At a hearing in Washington Congressman M. J. Kirwan told the House flood control committee of the necessity for immediate action for projects which will provide adequate water.

DEFEAT DOOR COSTS *with* MOTORIZED UNITS!

Exhaustive tests are proving that the rugged steel construction of the army's newest motor units, the efficient, versatile, so-called "Jeeps," are practically indestructible — next to impossible to wear out — one of their most valuable defense weapons.



You will find that the same kind of rugged all-steel construction makes the efficient, versatile Motor Operated Kinnear Rolling Door your best weapon for beating door costs!
Kinnear Rolling Doors stand off the attack of today's hard, fast, daily use. They resist fire, keep out all intruders and rioters, and defy the elements. They clear openings in double-quick time. A touch of a button opens or closes them. And you can provide as many convenient control stations as you want, often eliminating the need for special door attendants.

Coiling out of the way above the opening, Kinnear Rolling Doors are less apt to be damaged. Their famous interlocking-steel-slat curtain is harder to damage and easier to repair (slats can be replaced individually or in sections). Kinnear Rolling Doors save all floor and wall space for productive use — even ceiling space is kept clear for conveyors or other overhead equipment. They are versatile, too — built to fit any opening, and can be opened to any height. Write! The Kinnear Mfg. Company, 1760-1780 Fields Avenue, Columbus, Ohio

REMOTE CONTROL AN ADDED ADVANTAGE
Motor Operated Doors can be controlled from any number of conveniently located push-button stations. Saves time!

SAVING WAYS IN DOORWAYS **KINNEAR ROLLING DOORS**

You Aid Foe if You Do Nothing, A.S.M.E. Is Told

Pittsburgh

• • • **"Everything you do** has a bearing on the drive to strengthen your country and if you do nothing you help the other side," Maj. Benjamin S. Kelsey, chief of the pursuit branch, Wright Field, told a national defense meeting of the American Society of Mechanical Engineers, Pittsburgh section, here last week.

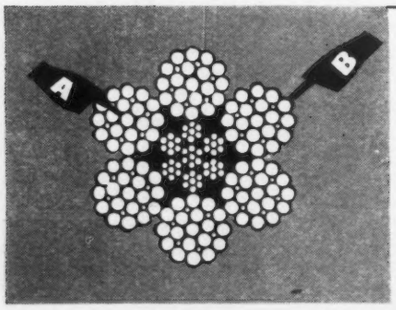
"Total war can be met by total defense," said Major Kelsey.

He returned to this country last July after serving as assistant military attache for air in the American Embassy at London.

T. J. McLoughlin, assistant to vice-president in charge of operations, Carnegie-Illinois Steel Corp., promised, "There can be no question that the steel industry will cooperate fully with the government. We are producing at more than 100 per cent of normal capacity and are going to keep it up." Mr. McLoughlin indicated that the transition from civilian to defense production in the steel industry has required a "terrific" change.

Safford K. Colby, vice-president, Aluminum Co. of America, in explaining the aluminum situation to the defense group, said: "Despite all the difficulties it can be safely stated that so far no essential defense deliveries have been held up by aluminum supplies. While this has been true, civilian users have had to suffer

Step up production safely!



MACWHYTE CRANE ROPES

2 Kinds of Wire Give Them EXTRA STAYING POWER!

A. EXTRA Flexible Inner Wires in every Monarch Whyte Strand PREformed rope are improved plow steel . . . specially designed with extra flexibility for service inside the strand.

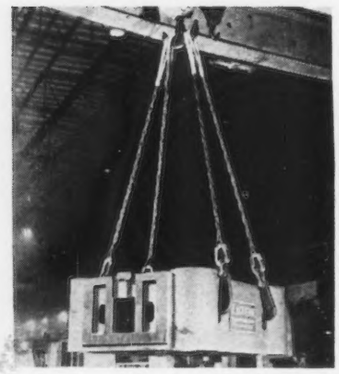
B. EXTRA Flexible Outer Wires in Monarch PREformed are also improved plow steel. They are made with a tough wear-resisting 'skin,' specially drawn for service on the outside of the strand.

A SPECIAL INTERNAL LUBRICANT protects those unseen, inside wires—the reserve strength of your rope, upon which safety depends.

Call your nearby Macwhyte distributor. *Write* for rope recommendations and prices. State make, model, capacity and use of your crane or hoist.

MACWHYTE BRAIDED SLINGS

Made from Left-&-Right Lay Endless Ropes For SAFE, FAST Materials Handling



You don't have to sacrifice speed for safety when you use Macwhyte Braided Slings. Why?... Because of their patented braided construction. Macwhyte Slings hug the load securely . . . carry it fast . . . lower it safely.

These slings are extremely flexible... lightweight . . . kink-resistant . . . non-spinning. They're extremely easy for one man to handle, quickly stored in small space.

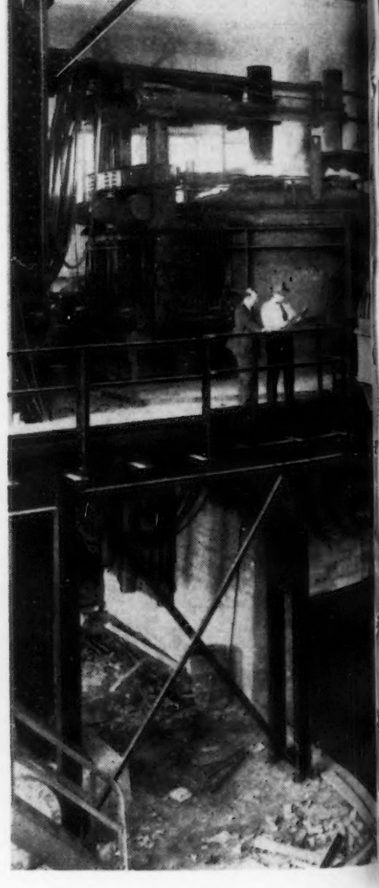
Don't wait. See your nearby Macwhyte distributor or write us. There's a Macwhyte braided sling for almost EVERY kind of job. Get set for tomorrow's needs TODAY... Ask for catalog and literature.

USE THE CORRECT ROPES FOR YOUR EQUIPMENT
Macwhyte
CRANE ROPES
★

SPEED YOUR DEFENSE CONTRACTS SAFELY . . . WITH
Macwhyte
ATLAS BRAIDED WIRE ROPE ★ SLINGS ★

MACWHYTE COMPANY, 2911 Fourteenth Avenue, Kenosha, Wisconsin. Manufacturers of Rope Wire, Braided Wire Rope Slings, Monel Metal Stainless Steel Wire Rope, Aircraft Cable, 'Safe-Lock' Cable Terminals, Aircraft Tie-Rods, and Wire Rope for all requirements.
New York · Pittsburgh · Chicago · Ft. Worth · San Francisco · Portland · Seattle · Distributors throughout the U. S. A.

READY TO POUR: Shortly before 65-ton electric furnace at Canton, this photo was taken. The furnace duction to 360,000 tons annually.



because of the unprecedented situation. What the future holds cannot be predicted."

Mr. Colby said the combined production of primary aluminum should exceed 800,000,000 lb. capacity in 1942, and whether this will meet the full requirements of defense depends on the progress of the war.

Dr. Webster N. Jones, director of engineering, Carnegie Institute of Technology, discussed the vital role of rubber in national defense and recommended a governmental subsidy for large scale synthetic rubber production.

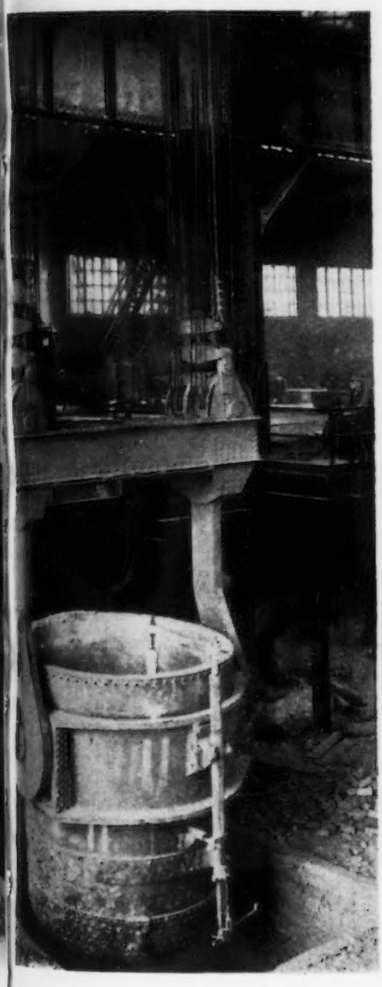
Lt. Col. James L. Guion, executive officer, Pittsburgh Ordnance district, told the engineers 55 per cent of the cost of new tanks is represented in many parts manufactured largely in the Pittsburgh district, while Capt. Frederick L. Oliver, Naval Material Inspector, said 20 per cent of the navy's business is made and inspected in the Pittsburgh district. Frank B. Bell, president, Edgewater Steel Co. and Pittsburgh Ordnance district chief, presided at the defense sessions.

Free Technical Courses Offered at Northwestern

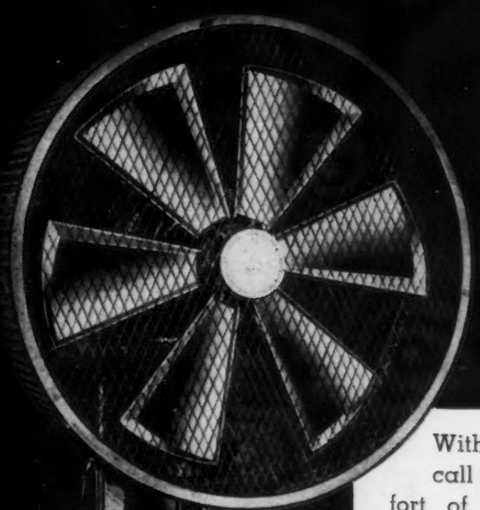
Evanston, Ill.

• • • **Free special technical** courses for high school students will be offered by Northwestern University as part of the defense training program. Three courses will be offered for 200 students, and more courses and students will be added this summer.

the Timken Roller Bearing Co.'s new Ohio, was ready to pour its first heat, steps up Timken's electric steel pro-



PERKINS
MAN COOLERS
TRADE MARK REGISTERED UNITED STATES PATENT OFFICE



With production the call of the hour, comfort of workers in hot places is supremely important. Perkins Man Coolers eliminate the depressing effects of extreme heat, restore energy and help prevent costly lags in production.

Oscillating and Stationary Types, both portable.

B. F. PERKINS & SON, Inc.
ENGINEERS AND MANUFACTURERS
HOLYOKE, MASS.

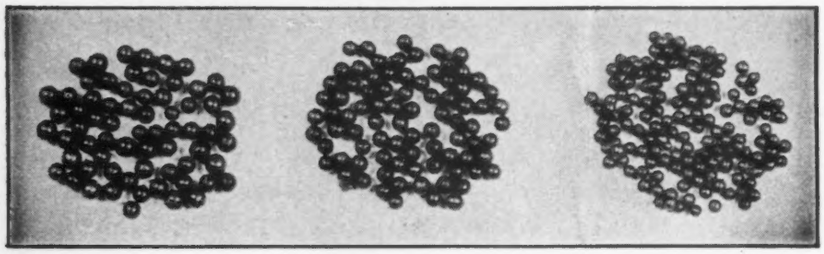
NEITHER FEAST NOR FAMINE

Unregulated air supply may be too much for some, too little for other types of air operated equipment. The correct and most efficient working pressure for each air operated machine means better performance, and most economical use of air power. Hannifin piston type pressure regulating valves are instantly adjustable—accurate and dependable, deliver the right working pressure for any type of air operated equipment. Made in 4 sizes, 3/8, 1/2, 3/4, and 1 inch. Write for Valve Bulletin 34-A.

HANNIFIN MANUFACTURING COMPANY
621-631 South Kolmar Avenue • Chicago, Illinois

ENGINEERS • DESIGNERS • MANUFACTURERS • DOUBLE-ACTING PNEUMATIC AND HYDRAULIC CYLINDERS, ALL SIZES

HANNIFIN *Pressure* REGULATING VALVES



HEAT-TREATED STEEL SHOT

We manufacture shot and grit for endurance

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

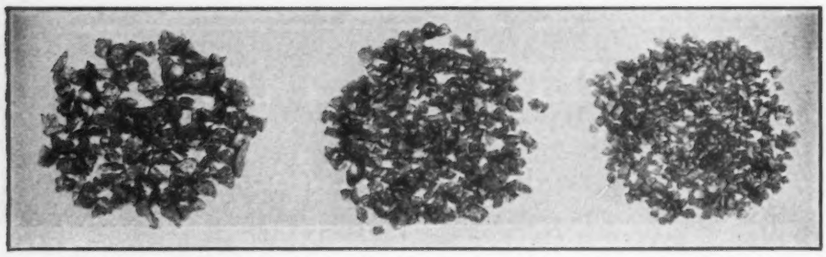
The unprecedented demand for our—

Heat-Treated Steel Shot and Heat-Treated Steel Grit

has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

HARRISON ABRASIVE CORPORATION
MANCHESTER, NEW HAMPSHIRE

HEAT-TREATED STEEL GRIT



Steel Payroll of 613,000 a New Record

• • • **Previous records** for employment in the steel industry were broken during March when 613,000 employees were at work, according to the American Iron and Steel Institute. The previous peak of 603,000 employees was first reached during the summer of 1937, and equaled again in February of this year.

Payrolls of the industry likewise set a new record in March, reaching a total of $98,025,000, compared with peak monthly payrolls in 1937 of $94,322,000. In February of this year, payrolls were $89,586,000, while in March, 1940, when steel employment averaged 514,000, monthly payrolls totaled $68,768,000.

Wage-earning employees in the industry earned an average of 87.7c. an hour in March of this year, as against 86.9c. in February and 83.6c. in March, 1940.

An average of 38.5 hr. was worked per week by wage earners in March, compared with 39.4 hr. per week in February and 32.3 hr. per week in March of last year.

New England Business Reaches 117.9% of Normal

Boston

• • • **New England business** activity, as measured by the New England Council's business index, reached 117.9 per cent of an estimated normal in March, a gain of 1.1 per cent as compared with February, this year, and 29.1 per cent as compared with March, 1940. Defense contracts awarded in March amounted to $54,345,000, including $39,477,000 for manufactured goods.

Royalties Waived on 'Van Lom' Steel To Aid Defense

Pittsburgh

• • • **Vanadium-Alloys Steel Co.,** Latrobe, Pa., has granted to all American tool steel makers and tool manufacturers the right to manufacture and use, during the national defense period, and without payment of royalties, the patented Molybdenum High Speed Steel made by this company under the "Van Lom" trade mark.

"Acted for Canada," National Steel Car President Declares

Toronto, Canada

• • • **National Steel Car Corp.,** important Dominion war industry whose Hamilton, Ont., plant has been taken over by the Canadian government following a SWOC strike, has acted "in the interests of Canada," R. J. Magor, president, declares.

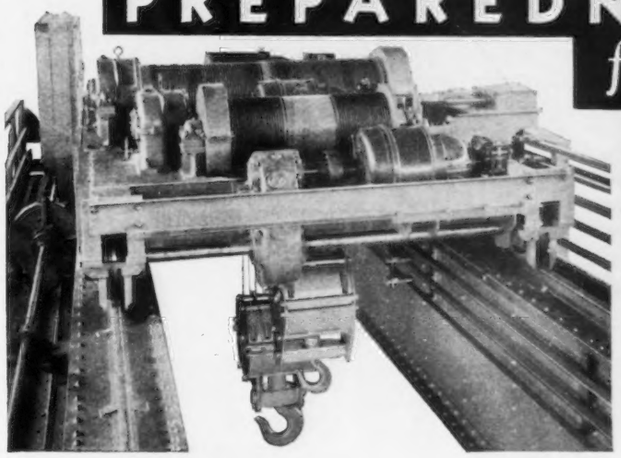
(Seizure of the Hamilton plant, which resulted in appointment of a government controller, has caused widespread discussion and debate of the government's action is expected in the Dominion House of Commons. For more details turn to page 83.)

Mr. Magor's explanation of the labor dispute which preceded the seizure follows:

"Our plant at Hamilton had been brought to a very high stage of production of shells for the British government when about last December the CIO-SWOC began its attacks on our organization. There had been no complaint as to wages, hours or working conditions from our production employees, nor from either the Department of Labor or the Department of Munitions and Supply, both of whom had, in accordance with their practice, investigated such matters in our plant and found them very satisfactory. On Feb. 2, 1941, the CIO-SWOC made application for a Board of Conciliation, claiming to act on behalf of certain maintenance men and carpenters. The whole of this group were less than 3 per cent of our total employees. How many of them were CIO-SWOC members we do not know. The Minister of Labor established the board on March 25 and, evidently encouraged by the attitude of the department, the CIO-SWOC subsequently claimed to represent other groups in our plant, the total still comprising less than 20 per cent of our employees.

"The Minister instructed the board to deal with alleged unjustifiable dismissals and to make an interim report on that part of the complaint, and not to deal with wages or hours. After deciding to 'defer any final decision with

INBUILT PREPAREDNESS for Years to Come



EUCLID CRANES & HOISTS

Simple accessible design is the keynote in the manufacture of Euclid Cranes.

All working parts are liberally proportioned with ample wearing surfaces. Safety factors are figured in accord with the best practice.

This, plus high grade materials and honest workmanship, means long, trouble-free service.

A new catalog is now available.

THE EUCLID CRANE & HOIST CO.
1361 Chardon Rd. Euclid, Ohio

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Any Metal
Any Perforation

For INDUSTRIAL purposes a great variety of sizes and shapes of perforations are required, ranging from very fine to as large as 6" or more in diameter. We are equipped to supply all standard perforations in all kinds and thicknesses of metals.

ORNAMENTAL patterns are covered by our grille catalog. If interested, we hope you will send for it. There are attractive patterns for different uses.

The Harrington & King PERFORATING CO.

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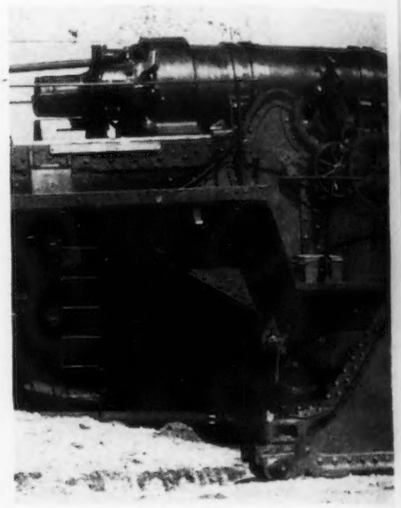
respect to cases of alleged wrongful dismissal or discrimination,' the board, solely on the ground that one George Tanner was president of the local union and an applicant for the board, recommended his immediate reinstatement though he had been dismissed for non-attendance during working hours and for late arrival.

"As the Board of Conciliation had not decided on the merits of his case and as it appeared that to reinstate him would be resented by the great body of our highly competent production and supervisory staff, we decided not to do so. The CIO-SWOC threatened the government with strikes in other war industry plants if the government did not compel us to reinstate Tanner. They have also indicated that this was merely the first step in their campaign not only against us, but against industry generally.

"The CIO-SWOC claimed to have secured the votes of 200 out of 2500 employees in favor of a strike and on the strength of this called a strike at our plant on April 27. Many of our production staff did not cease work at all. We had definite information from our men that 80 to 90 per cent of those who remained at home were not on strike, but at first preferred to avoid the unpleasantness that might be involved in going through the picket line. Within 32 hrs. a sufficient number of our regular employees had returned to enable several important departments to run at substantially full production. Thereafter, additional employees continued to come in hourly, by day and night.

"Notwithstanding this the government apparently yielded to the threats of the CIO-SWOC and by telephone advised the company that they would appoint a controller unless we should reinstate Tanner within 2½ hrs. After most anxious consideration we decided that we could not accept the principal of reinstating a man who had been dismissed for the causes above mentioned merely because he was an officer of the union and an applicant for the Board of



RAILROAD GUN: Weapons like these h
Northern Command to repel the expecte

CAUSPLIT is a new quick-setting cement with amazing chemical and mechanical resistance. It withstands a wide range of strong acids, alkalies and solvents at temperatures up to 350°F.

In addition, it is easy to handle and free from bothersome acid ingredients. Extensive tests have proved Causplit to be first-rate for corrosion-proof construction of industrial equipment. Actually, Causplit is a considerable improvement over Asplit, which has been widely used in many industries for more than 7 years.

CHEMICAL PLANTS: Causplit is the ideal cement not only because of its resistance to hydrofluoric, phosphoric and other strong acid conditions, but also because it is unaffected by alkalies, such as caustic, soda ash and hypochlorites. Causplit naturally stands up under the salts of alkalies and acids in the linings of equipment and floors.

PULP AND PAPER MILLS: Used in pulp digesters and bleaching systems to withstand both acids and alkalies. For instance, it is unattacked by sodium sulphite, sulphurous acid, chlorine, as well as hypochlorite, caustic soda and soda ash. Its characteristics enable it to withstand both mechanical and thermal shocks. Here again Causplit can be used for both tank and floor work.

STEEL MILLS: Causplit is used in the equipment for both acid and alkali cleaning of steels. It is not attacked by hydrochloric and sulphuric acids in the strengths used in the steel industry. It differs from most other acid-proof cements in that it is also resistant to hydrofluoric acid, which is used in the stainless steel industry.

Write or wire us for FREE TEST KIT, including samples, booklet of information and test data showing Causplit's resistance to various acids, alkalies and solvents. Pennsylvania Salt Manufacturing Co., Widener Bldg., Philadelphia, Pa.—New York • Chicago • St. Louis • Pittsburgh • Wyandotte • Tacoma.

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals

these have been prepared by Britain's expected German invasion.

Conciliation, especially as the board had not passed on the merits of the case.

"No question of wages, hours or working conditions is involved. As to these our production employees were not complaining and they had been favorably reported on both by the Department of Labor and by the Department of Munitions and Supply.

"By its precipitate intervention when production was rapidly getting back to normal through the voluntary return of our regular employees, the government saved the CIO-SWOC from the consequences of their defeat and thus gave them practical encouragement which can only be detrimental to Canada's war effort.

"The National Steel Car Corp., believing that it has been singled out as a test case, feels that the position it has taken has been necessary and justified in the interests of Canada."

* * *

Dominion Plant Will Build Martin Bombers

Toronto

• • • **A National Steel Car Corp.** plant is being re-tooled to permit production on a substantial order for new Martin bombing planes. The order placed for these Martin Bombers with National Steel Car Corp. is reported at about $18,000,000, the largest contract so far placed in Canada for aircraft.

The Department of Munitions and Supply has placed preliminary contracts in connection with the proposed government-owned plant at London, Ont., to cost $1,000,000, for overhaul and repair of airplanes and engines. The general contract has been awarded to Frontenac Construction Co., Toronto, at about $350,000, while structural steel contract goes to Sarnia Bridge Co., Ltd., Sarnia, Ont., at $125,000. Contracts for the large quantities of machinery and equipment have still to be awarded. It is stated that Fleet Aircraft of Fort Erie,

PRESSED COLD by PARISH In 4000 ton Press

The method best suited for each particular stamping—to insure most effective results, most efficient production and most modest cost—is employed when you present your problems to the Parish plant.

Equipped to handle all types of work in all methods and sizes of stamping, our plant is able to meet your specifications in all its elements, including the factor of time.

Illustrated is a Spring Plank for railroad freight car trucks. Made of 7/16" metal—16⅝" wide at ends, 14¼" wide at center, and 93¼" long with flanges 3⅜" high at center, 2 3/16" high at ends—it was pressed cold from heavy steel.

The submission of your requirements for review involves you in no obligation.

PARISH
PRESSED STEEL CO.
READING, PENNA.

Pacific Coast Representative
F. Somers Peterson Co.,
57 California St.,
San Francisco, California

PARISH Specialists in STAMPINGS of Distinction

Ont., headed by W. J. Sanderson, will operate the new plant.

Department of Munitions and Supply, for the week ending April 18, awarded 1620 contracts, with total value of $8,724,439. The more important awards include:

Capital expenditure—Anaconda American Brass, Ltd., Toronto, $535,120; Goodyear Tire & Rubber Co. of Canada, Ltd., Toronto, $592,378; Sternson Laboratories, Ltd., Brantford, $25,700; Canadian Vickers, Ltd., Montreal, $150,200; The Hall Machinery Co., Sherbrooke, Que., $33,000.

Metals—F. Bacon & Co., Reg'd, Montreal, $37,031.

Munitions—Dominion Arsenals, Ottawa, $416,250.

Ordnance—The Hall Machinery Co., Sherbrooke, $150,206.

Aircraft — Air Ministry, England, $161,178.

Mechanical Transport — Ford Motor Co. of Canada, Ltd., Windsor, $1,566,762; General Supply Co. of Canada, Ltd., Ottawa, $25,527.

War Construction projects—Dominion Engineering Co., Ltd., Lachine, Que., $145,910; Sangamo Co., Ltd., Toronto, $221,300; Walter G. Hunt & Co., Ltd., Montreal, $72,000; Ambrose Wheeler, Ltd., Moncton, N. B., $213,000; Bennett-Pratt Ltd., Toronto, $56,000; Tomlinson Construction Co., Toronto, $190,000; Newton Construction Co., Sherbrooke, $280,000; Richard & E. J. Ryan Construction Co., Montreal, $220,000; A. W. Robertson, Ltd., Toronto, $119,000; Frid Construction Co., Hamilton, $210,000; Marwell Construction Co. Vancouver, B. C., $250,000.

REEVES Motodrive Replaces Change Gears on Multi-Slide Machine

The race is not *always* to the swift. As often as not haste is made by operating a machine at a slower, rather than a faster rate. In either case it is the *correct speed* that turns out the greatest volume of approved production.

On this machine, change gears did not provide sufficient speed flexibility for all the different sizes and kinds of parts on the work schedule. When the gears were replaced with an infinitely variable REEVES Motodrive, however, production stepped up immediately from 110-120 parts per minute to 175 parts per minute. The Motodrive—one of 3 basic units in the REEVES line of speed control equipment—is a complete variable speed power plant, combining motor, speed varying mechanism and reduction gears (if required) in one compact unit.

REEVES Speed Control units have been successfully and *profitably* installed on almost every type of production machine. Write for free copy of new 24-page booklet, "How to Speed Up Production with Variable Speed Control," which illustrates and describes examples in 36 different plants.

REEVES PULLEY COMPANY, *Dept. I*, COLUMBUS, INDIANA

REEVES SPEED CONTROL

Canada's 1st Quarter Steel Output 554,482 Tons

Toronto

• • • **Iron and steel** production in Canada in the first quarter of 1941 showed a large gain over the corresponding quarter of 1940. Output of ingots and direct steel castings totaled 554,482 gross tons, which compares with 464,165 gross tons in the corresponding period of 1940.

March output of steel ingots and direct steel castings was 195,481 gross tons, an all-time high record, and compares with 172,689 gross tons in February and 157,326 tons in March, 1940.

Production of ferroalloys for the first quarter this year totaled 41,903 gross tons against 23,855 gross tons in the corresponding period of 1940. March output totaled 15,201 tons, which compares with 11,471 tons in February and 8298 tons in March, 1940.

Production of pig iron in Canada amounted to 296,288 gross tons in the quarter, against a total of 283,507 gross tons in the corresponding three months last year. March output amounted to 102,038 gross tons.

Closed Shop Up To Congress, G-M Says

• • • We firmly believe that a closed shop would not be good for the country, and that if such a form of labor organization should come about Congress should take the responsibility, and not the corporation by agreement with the Union, C. E. Wilson, president, General Motors Corp., said recently at a press conference.

Nickel-Bearing Steel Rulings Revised By OPM

Washington

• • • **In line with its effort** to procure inventory data on all metals in which shortages exist, the OPM Priorities Division has revised its former regulations on the distribution of nickel-bearing steel, requiring all purchasers buying directly from producers to file with the OPM complete statements on their inventory holdings.

These statements, it was explained, must show the inventory situation as of April 30. Producers' customers who, the OPM said, include most large industrial companies, will not be able to obtain deliveries after May 15 unless they have complied with this provision. Required to file the inventory statements are all purchasers of nickel-steel who buy directly from producers melting, casting or making such steel.

Other changes affecting the distribution of nickel-steel included the rephrasing of the original regulations, making them applicable to "converters" as well as to producers and distributers. Converters were defined to include "those who purchase nickel-bearing steel, further process such steel by rolling or drawing, and deliver such steel in rolled or drawn form to distributers and consumers."

Ordnance Plant Cuts Idle List

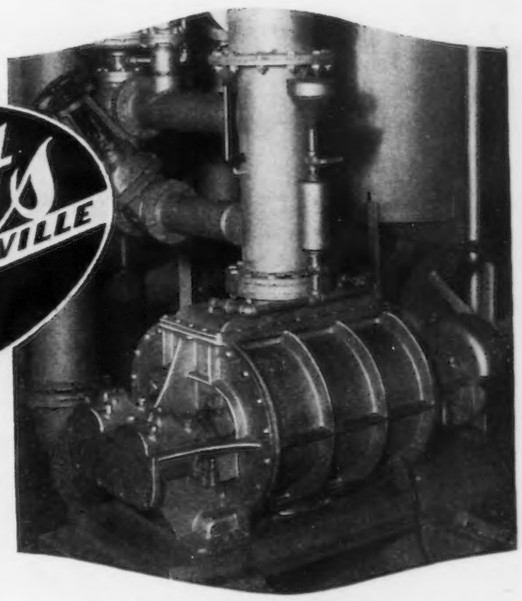
Alliance, Ohio

• • • **With 65 recently** transferred to work at the new naval ordnance plant in Canton, local WPA rolls are down to only 109 persons, lowest since the work program was inaugurated.

Steel Cutting Carbides Show Big Increase in Production

• • • **Indicative of the** tremendous increase in the use of carbide tools for machining of steel parts, the Carboloy Co., Inc., Detroit, reports for the first quarter of 1941 an increase of 459 per cent in production of tantalum-titanium carbides compared with the same period last year.

Comparing the first quarter of 1941 with the same period last year, the company report shows that the proportion of carbides for machining of steel to total carbide production has increased over 70 per cent. Up to early 1939 the vast proportion of carbide tool production was tungsten carbide which was used for machining of cast iron and non-ferrous metals.



Boost

GAS PRESSURE ECONOMICALLY

Wherever gas pressures have to be boosted, it is only natural that Roots-Connersville should be thought of because, with their many years' experience handling gases under all sorts of conditions and their varied line of pumping equipment for all capacities in the moderate pressure range, they are in position to make recommendations on gas pumping units best suited for your conditions.

Unit shown above is boosting gas in New York steel plant, capacity 117,000 cu. ft. per hour against 3 lbs. gauge pressure, V-belt driven from electric motor.

Bulletin No. 32-33-B-11 gives further details. Ask for your copy.

IN HANDLING AIR AND GAS Experience Counts SINCE 1854

★ ROOTS ★

CONNERSVILLE BLOWER CORPORATION

105 Ohio Avenue,

Connersville, Indiana

NEW YORK CHICAGO POTTSTOWN, PA. SAN FRANCISCO
DETROIT ST. LOUIS LOS ANGELES PITTSBURGH BOSTON

Jackson Outlines U. S. Anti-Trust Law Policy

Washington

• • • **Anti-trust law policy** for the duration of the defense emergency, covering the course to be followed by the Justice Department in the face of the increasingly large number of industry meetings, has been set forth by Attorney General Robert H. Jackson. The interpretation suggests to some observers that the OPM may be planning to recommend the establishment of industry committees through which defense work could be expedited.

In a letter to OPM General Counsel John Lord O'Brian, Mr. Jackson explained that his statement of policy was prompted by the likelihood of future allocation of orders, the curtailment of some types of production, the establishment of priorities, the pegging of prices and other practices which under normal circumstances would constitute violations of the anti-trust laws. Briefly, he put his stamp of approval on industry meetings when suggested by and carried on under the supervision of the OPM, but warned that his department "reserves complete freedom" to prosecute any acts deemed to be contrary to the public interest.

While Mr. Jackson's statement of anti-trust policy follows closely the testimony of Assistant Attorney General Thurman Arnold given the Temporary National Economic Committee several months ago, **the Jackson letter** represents the first formal declaration of anti-trust policy and one which will guide the department in its future relationships with the OPM, the OPACS, and with all industries or contractors acting in compliance with government requests.

In short, the Justice Department set forth this policy:

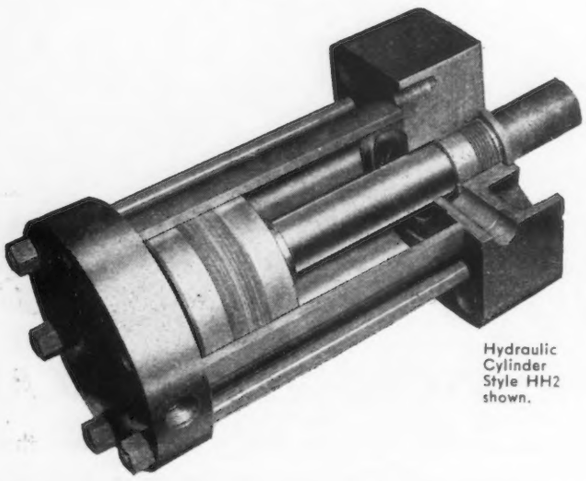
1. **Industry meetings** with OPM and OPACS are not illegal. In fact, industrial committees, limiting the scope of their activities to the Justice Department policy and acting at the request of government defense agencies, can select their own representatives.

2. **Sole responsibility** for the need for such committees is placed upon OPM and OPACS, and the Justice Department will not participate beyond saying that committee members should be representative of the entire industry and satisfactory to the government defense agencies involved.

3. **Such committees** could not undertake to determine industry policy nor compel compliance with any request or order made by a public authority but would be required to confine themselves to collecting and analyzing information and making recommendations to OPM or OPACS.

4. **The determination** of steps to be taken in the public interest by the industry involved could not be made by an industry committee but only by the OPM or the OPACS. An individual unit of the industry could request a plan of action but a determination of the plan itself could not be made by

there's a lot of difference in . . . cylinders



Hydraulic Cylinder Style HH2 shown.

Cylinders must be built not only to resist wear but to exert the maximum amount of power that a given bore cylinder operating at a given pressure per square inch—can theoretically exert. This gets all there is out of the compressed air or hydraulic pressure supplied.

To do this, T-J Cylinders use low friction factor leathers that at the same time provide an effective seal. ***T-J Air Cylinders when used at 80 lbs. pressure p.s.i. and T-J Hydraulic Cylinders when used at from 500 to 1500 lbs. pressure p.s.i. perform at an average mechanical efficiency of 95%.***

We will gladly go over the construction features of these cylinders with you . . . representatives in principal cities.

THE TOMKINS - JOHNSON CO., 628 N. Mechanic Street, Jackson, Michigan.

this is a **TOMKINS-JOHNSON** *product*

the industry itself or by industry representatives.

5. **Requests for action** within a given field, for example, the allocation of orders, would have to be cleared with the Department of Justice although once approval is given to a general plan each detailed action proposed under the general plan would be made in writing and require approval of OPM general counsel, or the general counsel of OPACS. However, the latter arrangement would be subject to revocation upon notice by the Attorney General in the event of any personnel changes or if "serious practical difficulties" arose.

6. **Acts in compliance** with specific requests of and approved by OPM and OPACS will not be viewed as constituting a violation of the anti-trust laws and no prosecution will be instituted for acts "performed in good faith and within the fair intendment of instructions given by OPM or OPACS."

7. **The department** reserves complete freedom to institute civil actions to enjoin the continuing of acts or practices found not to be in the public interest and persisted in after notice to desist.

Steel Siding Used For Army Buildings

• • • **Three Army mobilization** cantonments, Camp Wolters, Mineral Wells, Tex.; Camp Wheeler, Macon, Ga.; and Fort Riley, Kan., each comprising 600 or more buildings of standardized types, are being erected; using formed steel siding as an exterior covering material, instead of wood.

As originally planned all cantonment structures were designed for complete construction with lumber. Government authorities, however, decided to specify the use of steel weatherboard siding for the outside covering of exterior walls for certain cantonments as alternate construction, and accordingly made certain changes in the design.

The standard weatherboard siding sheets and the trimmings being manufactured for cantonment buildings are formed from 26 gage galvanized steel sheets with regular weight of zinc coating for this gage in accordance with Fed. Spec. Q.Q.-I-696 Class "C"—capable of withstanding at least three one-minute dips by the standard preece test.

After galvanizing, the flat sheets are roller coated on the side to be exposed after erection with one coat of baked-on zinc dust-zinc oxide primer conforming to Fed. Spec. T.T.-641 Type II Class "B."

Midland Strike Settled

Cleveland

• • • **A dispute which** began April 30 and made 1400 workers idle at the local plant of Midland Steel Products Co. was settled May 2 when the management agreed to begin negotiating for the adjustment of wages of individuals in the tool room. The plant produces automobile frames, parts and air brakes.

Cincinnati

HERRINGBONE GEARED

HYPRO OPENSIDE PLANERS

When buying a modern planer check these features:

MAGNETIC DIAL FEEDS (Patented) Individual for rail heads and side heads. Feeds selectable by 64ths from 1/64" to 1" with a twist of the wrist. Feeds may be changed at any position or direction of table travel. Heads may be fed at either end of table stroke.

STEEL TEE SLOT INSERTS (Patented) Table Tee Slots are fitted with steel inserts so that lower edges will not be damaged by bolt heads. This construction prevents pulling out of tee slots insuring perfect condition of table throughout life of machine.

DOUBLE BRONZE NUTS Used on all down feed and cross feed screws in all saddles and slides. This construction provides double life for all screw movements as all thrust and wear is taken by two nuts instead of one.

EXTENDED SADDLE AND HARP To provide extra support for the slides along with an additional long-leverage bolt circle producing maximum rigidity between saddle and harp.

Examine the Hypro Openside Planer critically. Full particulars in our new Bulletin No. 110 sent free on written request.

PLANERS • PLANER MILLERS • BORING MILLS

THE CINCINNATI PLANER CO.

CINCINNATI, OHIO

Railroads Urged To Place Orders For New Equipment

• • • **Railroads have been** urged by the Association of American Railroads to embark on a program of freight car buying that will involve a total of 270,000 units to handle the heavy traffic anticipated for 1942 and 1943.

Unless the railroads immediately make known their steel requirements for new freight cars and car repairs, their position later on, when more strict allocation of available supplies occurs, may be a serious one. Already there have been some delays in freight car construction owing to delayed deliveries of steel. Arrangements have been made at Washington, however, whereby preference will be given to steel orders from car builders.

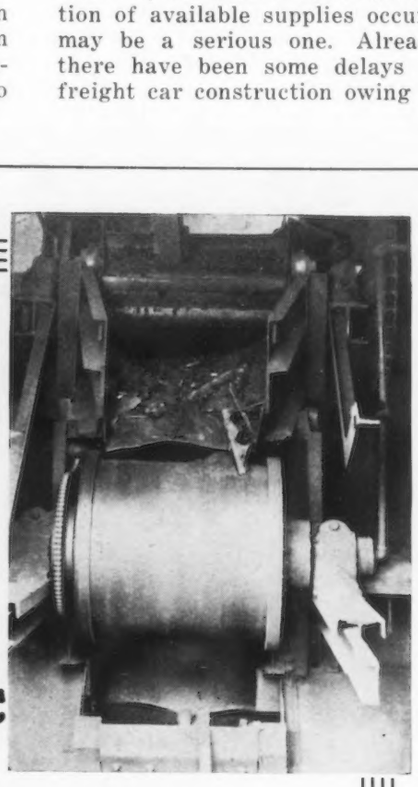
There were arguments at Washington that ships should come ahead of railroad cars in the allocation of plates, in which the supply situation is tight, but the railroad answer to that is that ships will be of no use unless the railroads can transport goods to seaboard.

Car builders now have on order about 45,000 freight cars, and in addition to that number railroads have placed orders with their own shops for a total of about 10,000. Car builders have been asked how many additional cars can be built between now and the end of this year. Their answer is that 13,400 additional can be built between now and Oct. 1, and that after Oct. 1 they can build about 7500 a month, not counting 2500 a month that the roads could build in their own shops.

Opinion at Pittsburgh and in other steel centers is that the railroads should immediately specify steel and other materials needed for freight cars that are to be ordered in the immediate future.

More than 100,000 freight cars were mentioned as the 1941 esti-

A Difficult SAND RECLAIMING Job Licked by Stearns MAGNETIC



HOW to eliminate the scrap metal from hot sand coming off of a steel conveyor was a problem in the foundry division of a prominent automobile maker. And this sand was hot! Conveyor belts were out of the question.

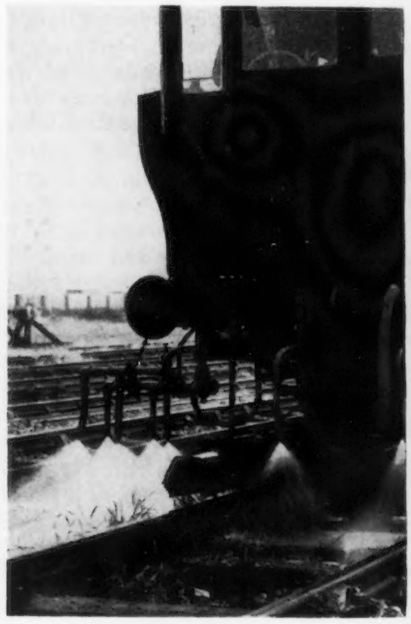
STEARNS Magnetic engineers were consulted and made a study of this problem. Out of their many years of experience in solving foundry problems they installed this specially designed and constructed magnetic drum. It's doing a swell job!

Avail yourself of STEARNS Magnetic advice on sand reconditioning problems or other jobs involving the removal of iron. We can give you a positive, automatic, time and labor saving method with STEARNS Magnetic equipment.

We will be glad to mail this folder or other Bulletins on Magnetic Separators. Write for them.

STEARNS MAGNETIC MANUFACTURING CO.
635 S. 28th St., Milwaukee, Wis.

FIRE-FIGHTING TRAIN: The ... verted one of its trains into a fire- ... in that country.



mate earlier this year, and to date about 43,000 have been placed. Circumstances have changed materially, however, the factors upon which the 100,000 freight car estimates were based.

A summary of shipping factors, some of which will coincide as to time and most of which have been initiated only recently, are as follows: Heavy transportation by rail of ship plates from East to the West Coast due to lack of ocean bottoms; numerous short and long hauls of ordnance material from place of origin to final assembly which includes ammunition as well as guns; utilization of railroad equipment for hauling soldiers and supplies on special maneuvers; use of railroad equipment for the transportation of supplies needed for building up the United States Army; the certainty that all available coal cars will be in service for some time as an attempt is made to make up for the month's shutdown; a heavier grain movement; and a general upsurge in the movement of commercial material. Many of these factors will be operating at a time when the normal peak of railroad traffic is in progress.

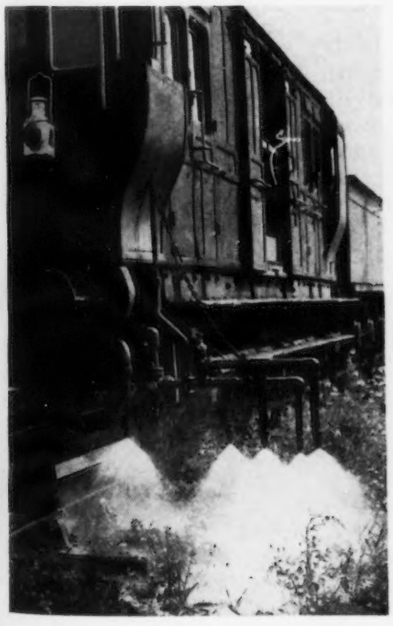
Informed sources believe that the fundamental question of transportation has not received proper attention at Washington. It is held by railroads, car builders, and steel officials that unless a crisis is to be faced later it will become necessary to put railroad equipment material on an equitable basis with ship plates and other national defense items on the "critical list."

The steel Industry has already reached the point where the major rolling schedules for plates and structural shapes are taken up for the remainder of the year, mostly on defense items.

Most freight car builders are operating at only 40 to 50 per cent of capacity because the special types of steel needed are not available in sufficient quantity to maintain full time operation. It is pointed out that car shops must have all types of steel products necessary for freight car construction reach the plants at the proper time in order to maintain

Southern Railway (England) has confighting unit, the only one of its kind

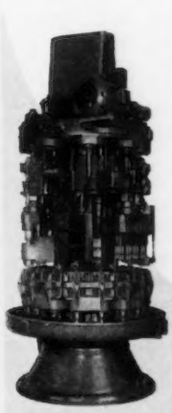
Photo by British Combine



IS YOUR PROBLEM DELIVERY OR PRODUCTION?

You Can Afford To Wait for Production Like This

Generally it takes longer to build a special machine than it does to build a standard tool. But with deliveries on *all* equipment equally unattractive, it may pay you to wait a little longer for a special machine . . . one fitted to *your* job alone. Any time lost in delivery will soon be made up in greater productivity. You'll get less spoilage through greater accuracy. Here are the results of our work with one manufacturer:



MACHINE IN BRIEF

Eight station, Center Column machine, provided with 7 working and one loading station. Except for loading and unloading, machine is entirely automatic.

Fixture and tooling are special . . . designed for wheel cylinders alone. The rest of the machine is standard and can be retooled for similar or dissimilar parts.

Unskilled operators have no trouble in operating the Center Column machine.

WHEEL CYLINDERS PRODUCED AT RATE OF SIX HUNDRED PER HOUR

These wheel cylinders, used in hydraulic automobile brakes, are rough and finish hollow-milled, chamfered, drilled, and tapped *simultaneously*. Production is over six hundred cylinders per hour, and *spoilage is less than one-half of one percent.*

STANDARD ELEMENTS MAKE ECONOMICAL SPECIAL MACHINES

You'll find our engineering service backed by many standard hydraulic and machine units. This makes it possible for you to avail yourself of the advantages of special machines with a reasonable investment. How it has helped other manufacturers is shown in our booklet "Since 1872 . . . . May we send your copy?

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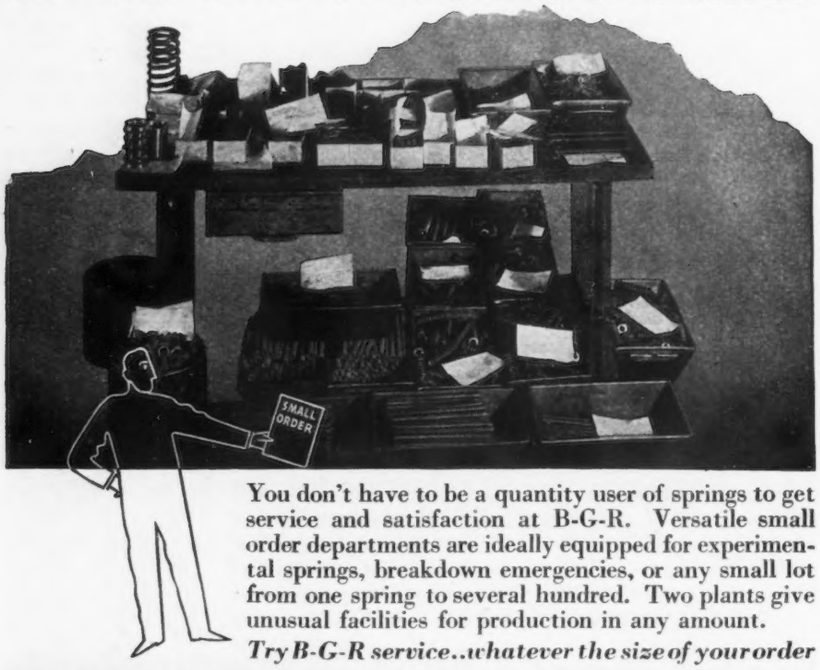
DESIGNERS AND BUILDERS OF DRILLING, BORING, TAPPING, MILLING, AND HONING MACHINES TO SUIT YOUR PARTS — YOUR PRODUCTION.

B-G-R COMES THROUGH » » » for the small user of SPRINGS



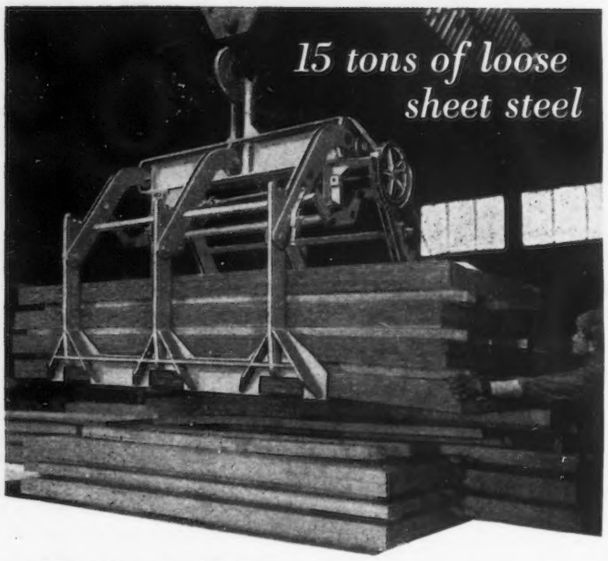
You don't have to be a quantity user of springs to get service and satisfaction at B-G-R. Versatile small order departments are ideally equipped for experimental springs, breakdown emergencies, or any small lot from one spring to several hundred. Two plants give unusual facilities for production in any amount.

Try B-G-R service..whatever the size of your order

BARNES-GIBSON-RAYMOND

DETROIT PLANT DETROIT, MICHIGAN ← DIVISION OF ASSOCIATED SPRING CORP TWO PLANTS → COOK PLANT ANN ARBOR, MICHIGAN

Handling but not damaging



with safe one-man control.

Here is lifting done conveniently, without dangerous hazards to man or materials. Just one man can load, unload and operate this lifter for fast, economical service.

•

C.F. Sheet Lifters permit handling sheet steel by the bundle . . . any size bundle. Jaws have infinite adjustment with positive control in any position and minimum of clearance is required between stacks for operation of lifter. Mail coupon today for circular SL 18.

C.F. Sheet Lifters are fast working machines providing convenience, economy and safety for handling loose or bundled sheet steel with capacities up to 60 tons.

CULLEN-FRIESTEDT COMPANY
1303 South Kilbourn Ave., Chicago, Ill.

Gentlemen: Please send me bulletin SL 18.

Name ..... Title .....

Firm .....

Address .....

straight line and efficient production. An extra supply of plates without corresponding bar or structural requirements would be of little help.

The tremendous pressure on the steel industry to get out ship plates in record time regardless of other commitments has delayed deliveries to freight car builders and pressure from the latter is at boiling point.

The three-point situation involving the railroads, steel maker and freight car builder may become a major controversy in the national defense program unless the situation is completely and immediately analyzed, according to informed sources.

THE IRON AGE has learned that car shortages have already cropped up and that authoritative opinion indicates a severe car shortage by mid-October when peak traffic movement is in progress, unless an almost miraculous change in the present transportation problem is brought about.

McEwan Chicago Manager For Defense Contract Service

• • • **Thomas S. McEwan** has been appointed district manager in the Chicago Federal Reserve District for the Defense Contract Service of the OPM. His job will be to help spread defense work among as many firms in this area as possible.

Steel Labor Shortage Not Serious, So Far

• • • **With 150,000 more** workers employed than in the summer of 1939, the steel industry to date has experienced no labor shortage serious enough to curtail its current record output, according to a survey by the American Iron and Steel Institute.

Coal Price Ceiling Removed

• • • **Price Administrator** Leon Henderson has removed the price ceiling fixed for bituminous coal on April 16 but warned that price action may be renewed if unreasonable prices are charged. The Henderson action on coal was ordered to avert price increases due to curtailed supplies while the coal strike was pending.

19 Societies Backing Western Metal Show

• • • **Western sections of** 19 national technical societies will cooperate in the Western Metal Congress and Western Metal Exposition to be held May 19-23 at Los Angeles.

The congress will be held under auspices of the American Society for Metals, American Welding Society, American Foundrymen's Association and other organizations.

Displays by the 150 companies utilizing the 80,000 sq. ft. of space at the Pan-Pacific Auditorium will be focused on the theme of "new aids to production." Morning, afternoon and evening sessions of the A.S.M. will be held on all five days of the congress. The Metal Exposition will be open every day from noon until 10:30 p. m., except Thursday (noon to 6 p. m.).

The American Welding Society will hold technical sessions Monday through Thursday, with the annual regional luncheon Monday noon at the Biltmore Hotel. Foundry Day will be observed Friday, May 23, by the American Foundrymen's Association. Headquarters for the metal congress will be at the Biltmore Hotel.

Domestic Manganese Output In March Drops to 1800 Tons

Washington

• • • **Domestic production** of manganese ore containing 35 per cent or more manganese (natural) during March 1941 was 1800 gross tons, shipments were 2000 tons, and producers' stocks at the end of the month were 2100 tons, according to the Bureau of Mines. These figures are predicated on reports received from producers that accounted for 87 per cent of the total in 1939. In February, production was 2500 tons, shipments were 2400 tons, and producers' stocks at the end of the month were 2300 tons. The rate of shipments averaged 2442 tons monthly in 1939, when the total amounted to 29,307 tons.

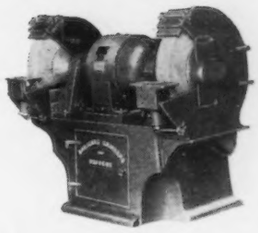
General imports in March of metallurgical manganese ore (35 per cent or more manganese) totaled 63,799 tons of contained manganese.

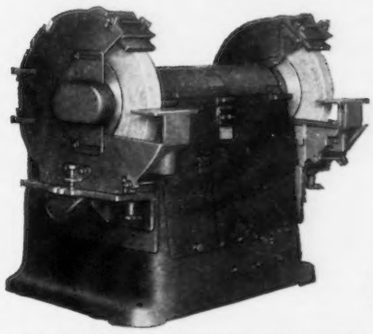
Another Reason Why

MARSCHKE GRINDERS

SAVE YOU MONEY

THE BIG EXPENSE in grinder operation is wheel wear. MARSCHKE Multiple Speed Stand and Swing Frame Grinders lengthen wheel life by maintaining correct s.f.p.m. Adjustment of guard as the wheel wears *automatically* speeds up D.C. motor, or with A.C. motor forces operator to change wheel speed at correct time. This is one of 18 important features making MARSCHKES the best buy.





SEND FOR CATALOG on the *quality* MARSCHKE Line of Grinders and Buffers. Seventy specifications, from 1 to 25 HP, 10" to 30" wheels.

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ALLOY STEELS

HY-TEN

Send for Data Sheets

Write for data sheets giving compositions, physical properties, heat-treating guide and applications of our complete line. Keep them handy for reference and be prepared when you need steel in a hurry. Our seven convenient warehouses assure prompt deliveries.

Complete Stocks at
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Wheelock, Lovejoy & Co., Inc.
Main Offices: 126 Sidney St., Cambridge, Mass.

Put Plants on 24 hr. Basis, Roosevelt Asks

Washington

The Office of Production Management undertook this week the job of carrying into action President Roosevelt's request that defense manufacturing facilities eventually be placed on a 24-hr. basis, that machine tool production be stepped up ahead of schedule, and that the country be further combed for skilled mechanics for use in defense work.

William S. Knudsen, OPM director general, urged machine tool manufacturers to "forget everything except the welfare of the country" and set up around-the-clock defense production. In his letter to manufacturers, Mr. Knudsen placed the responsibility on producers but expressed the view that "your aggressiveness" will insure that the job will be well done.

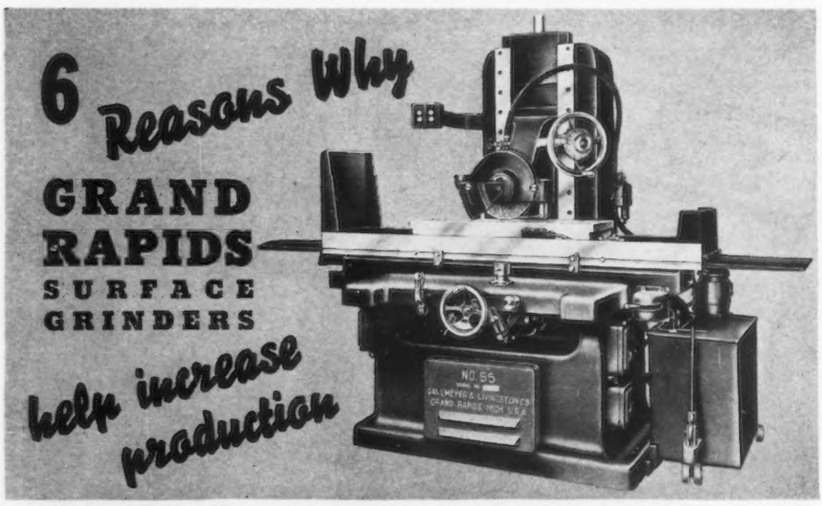
Mr. Knudsen suggested that some manufacturers, instead of waiting for orders to be filled for new machines, attempt to secure second-hand tools to do the job. He likewise emphasized the necessity of utilizing for defense production machine tools which are now engaged in part-time non-defense work.

As a method of securing maximum production during the summer months Mr. Knudsen late last week recommended that defense industries pay bonuses to workers, who voluntarily forego vacations, the equivalent amount of money they would receive during the customary vacation period. The recommended policy, it was explained, was applicable only to private employers having vacation plans and was not intended to deny vacations to workers who for reasons of health desire a rest.

At the same time, Robert L. Mehornay, chief of OPM defense contract service, directed his 36 field offices to undertake anew "every practical method of spreading present defense work" into plants not now working on defense orders. He also urged contractors to take all feasible steps to get maximum output out of every machine tool engaged in defense production.

Mr. Roosevelt made public his letter to Mr. Knudsen at a press conference, during which the Chief Executive observed that the expansion of the machine tool industry and the increasing use of critical machines more hours a day while encouraging, was "not enough."

"The ever increasing demands for munitions, planes and ships, caused by the critical situation which confronts our nation, requires that they be produced in even larger quantities and ahead of the schedules assigned to them," the President wrote. "It is essential that industry continue to increase the number of vital machines manufactured and that every single critical machine in the United States be used the maximum number of hours each week."



★ **INFINITELY VARIABLE TABLE SPEEDS**
Hydraulic Feed permits table speeds in an infinite range from 0 to 125 ft. per minute. . . . . .

★ **MASSIVE COLUMN AND BASE**
Cast in one piece to assure permanent alignment of vertical and horizontal ways. . . . . .

★ **VERNIER WHEEL MOVEMENT**
Control in head graduated in .0001". Graduations ⅛" apart, easily split even on production operations.

★ **LESS GEARING—SMOOTHER WORK**
Hydraulic Feed eliminates gears—produces smoother work free from "gear marks." . . . . . .

★ **EXTRA RIGID SPINDLE MOUNT**
Makes it possible to use formed wheels for contour grinding or double wheels as in straddle grinding.

★ **TWO SPINDLE SPEEDS**
Spindle speeds can be increased to use worn wheels making a big saving in wheel cost. . . . . .

GALLMEYER & LIVINGSTON CO.
200 STRAIGHT AVENUE, S.W. GRAND RAPIDS, MICHIGAN

Five More Defense Plant Expansion Agreements Signed

Washington

• • • **The Defense Plant** Corp., RFC subsidiary, has executed lease agreements for the production of defense equipment with these companies:

Vickers, Inc., Detroit, $541,721 for the expansion of facilities previously leased to the company in connection with the manufacture of hydraulic equipment, artillery fire control equipment and other products.

American Bosch Corp., Springfield, Mass., acquisition of equipment machinery and tools to cost $761,409 for the manufacture of aircraft parts.

Willys-Overland Motors, Inc., Toledo, rehabilitation of a building to cost $102,000 and equipment to cost $2,070,000 for the manufacture of aluminum forgings for aircraft.

Revere Copper & Brass Inc., New York, for construction and equipping a plant at Chicago to cost $10,000,000.

Reliable Tool & Machine Works, Milwaukee, has been given an RFC loan for $25,000 to buy machinery for making torpedo tubes.

10% Cut in Tin Can Coating Asked by OPM

Washington

• • • **Estimating a possible** saving of 17 per cent in the tin consumed by the container industry, the OPM's production division has asked the can manufacturing industry and producers of tin plate to institute a 10 per cent reduction in the tin coating of most cans to speed up the accumulation of tin reserves.

W. L. Batt, deputy director of the division, placed the quantities of tin on hand as enough "to carry us through 14 months," and told can manufacturers to continue the present amount of tin on containers for certain packs but to restrict the use of tin for other packs. Mr. Batt laid down this formula:

1. For most types of tin cans use tin plate with a tin coating weighing 1.35 lb. per base box—112 sheets of tin plate 14 in. x 20 in. or equivalent—instead of 1.5 lb. as at present.

2. Substitute terne plate for tin-coated containers wherever feasible. Terne plate is already being substituted for tin plate in many types of paint cans.

3. Use black plate, already being used for the sides of oil and other containers, wherever terne, or tin coatings are not required.

Tin plate producers were asked to change their manufacturing practices in accordance with the suggested specifications not later than May 15. Can manufacturers were given until May 30 to adopt the practices.

Members of the can manufacturing industry recently told OPM that a 10 per cent reduction in the weight of tin coating on cans could be made safely for about 95 per cent of all tin can uses.

$200,000 Fire Reported at Pressed Steel Car Co. Shop

Pittsburgh

• • • **A $200,000 blaze at** the Pressed Steel Car Co. plant, McKees Rocks, near here, severely damaged machine tools and motors in the company's wheel and axle shop. According to officials, work scheduled here will have to be sublet for a time.

LEWIN-MATHES *Got the right answer at*

ETNA

They had a job of pointing heavy-walled copper tubing, and wanted to speed up the operation. Just how to do it didn't appear on the horizon, and so Lewin-Mathes did the safe and logical thing—they put their swaging job up to Etna.

The answer to that problem is illustrated on this page. It's a modern Etna Swaging Machine that points *more* copper tubes per hour in less time at less cost. If you have a problem involving tapering or reducing tubing and solid rounds—ask Etna about it.

Etna has the swaging machines from 3/8" to 4" and the experience to help you get the most out of this type of machine.

IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING... "Ask ETNA About Swaging"

ETNA MACHINE COMPANY
TOLEDO OHIO

"HERCULES" RED-STRAND WIRE ROPE
REG. U.S. PAT. OFF.

You Can Depend On "Hercules" (Red Strand) Wire Rope

Highlights of Quality

1. Acid Open-Hearth Steel Wire
2. Rigid Tests and Inspections
3. Correct Manufacturing Methods
4. Furnished in both the Round and Flattened Strand constructions, in either Standard or Preformed Type.

• • *Results are what count, and the performance record of this wire rope continues to make and hold friends.*

There is no guess work when you use "HERCULES" (Red-Strand) Wire Rope. It is designed and built to do specific jobs better . . . safer . . . more economically. If you will tell us how you use wire rope, we shall be glad to suggest the construction and type most suitable for your conditions.

MADE ONLY BY
A. LESCHEN & SONS ROPE CO.
WIRE ROPE MAKERS — ESTABLISHED 1857
5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

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SEATTLE • • 3410 First Avenue South

Schedule of Aluminum Prices Amended By Henderson

• • • **Amendments to the schedule** which established maximum prices for aluminum scrap and secondary aluminum ingot, were announced last Saturday by Price Administrator Leon Henderson. The amendments became effective May 5, 1941.

The following are the principal changes made:

(1) The maximum price at which a maker of the scrap may sell old aluminum sheet and aluminum utensils is lowered from 12c. to 11c. per lb. No other change is made in the maximum prices of any grades of aluminum scrap or secondary aluminum ingot.

(2) It is emphasized that all maximum scrap prices are for clean and dry scrap and that material not meeting these standards should be sold at prices reduced below the maximum prices in proportion to the percentage of dirt and moisture.

(3) There has been eliminated the provision which allowed makers of scrap to request permission from OPACS to sell directly to smelters at prices as high as the established dealers' prices where such sales were customarily made prior to issuance of the price schedule. This provision had caused some makers to expect exemption in cases in which the smelter performed functions of a dealer. In lieu of this provision, there has been added a paragraph exempting from the schedule customary sales of extrusion butts and ends, sheet clippings or rod turnings of not more than one alloy, and pure clips, where such sales are made by the maker of the scrap to the producer of the material from which the scrap is made and pursuant to a written contract for the reconversion of the scrap into like material and for sale of an equivalent amount of like material to the maker. The contract prices must not, however, have been increased since March 24, 1941.

(4) Aluminum scrap which is delivered in less than carload lots must be sold at prices ½c. under the established maximum prices set forth in Appendix A of the price schedule.

Olds Warns Against Obstacles to Output

• • • **The recent government** order freezing steel prices at the March 31, 1941, level was described as a "further complication of serious moment" by Irving S. Olds, U. S. Steel Corp. chairman, at the corporation's annual meeting early this week.

"Effect of higher costs upon the future earnings of the corporation and the adequacy of existing steel prices to enable the steel industry fully to perform its duties in the great emergency confronting this nation are subjects now being carefully studied," Mr. Olds said.

"It seems clear," the U. S. Steel chairman added, "that a governmental pricing policy would not be in the best interests of the country, if the consequence thereof should be to restrict production by such an essential industry as steel, every ton of whose capacity must continue to be available for utilization in these perilous times."

There can be no doubt about the propriety of the steel industry earning a fair return on its investment while operating at full capacity, when fluctuations in steel demand are considered, he said.

Mr. Olds warned the corporation's stockholders, meeting at Hoboken, N. J., that "this apparent prosperity may well prove to be of a fitting character without a sound economic foundation, as to a large measure it stems from war abroad and from our own intensive and gigantic defense program. War brings only transitory profits and results in long continued, serious disturbances and enduring increases in costs, he said.

Taxes since the organization of U. S. Steel have increased more than 35 fold, the total tax bill reaching $84,420,000 in 1940, a gain of $30,000,000 over 1929. Wages and salaries took $439,000,000 in 1940, a year of lower operations and lower sales receipts, compared with $420,000,000 in 1929.

The corporation's present rate of operations over a year would produce more steel than the annual steel capacity of Germany, Mr. Olds told stockholders, and the tonnage would be approximately equal to the combined steel capacity of Great Britain, France and Belgium.

OPM Sets Auto Output For Year at 4,224,152 Units

Washington

• • • **Automobile manufacturers** were notified by OPM last Saturday of their individual allotments of motor vehicles to be manufactured in the year Aug. 1, 1941, to July 31, 1942. The scheduled reduction in material requirements has been accomplished, as the final total allotted amounted to 4,224,152 motor vehicles against 5,289,972 manufactured in the preceding year, or a reduction of 1,057,994 units equaling 20.15 per cent.

The allotments to individual companies give due regard to the necessity of maintaining the relative position of the different companies in the industry, their size, field organization employment and their relative position in regard to passenger vehicles and trucks.

Small companies manufacturing less than 2000 units have not been curtailed. Companies manufacturing trucks exclusively have been curtailed 5 to 10 per cent depending upon the volume of their business. Medium sized passenger car companies have been curtailed approximately 15 per cent and the large companies have been reduced 21½ per cent.

It is the hope of the OPM that the material saving desired has been attained intelligently. Every effort will be made to transfer to defense work equipment and men made available by the reduction.

Request is further made that the industry practices the greatest possible economy in the use of the following critical materials: Neoprene, nickel, chromite, magnesium, ferro tungsten, nickel-steel, zinc, copper and aluminum. OPM said that if further reduction in critical material allotments become necessary, due notice will be given to the industry.

Wisconsin Defense Orders Rise

• • • **Wisconsin manufacturers** have been awarded $12,959,200 in contracts for national defense materials during the period of April 1 to 15 of which $12 million is for the navy and some $750 thousand for the army. Nordberg Mfg. Co. accounted for about $12 million of the total.

April Pig Iron Production Declined To 4,334,267 Tons

PRODUCTION of coke pig iron in April totaled 4,334,267 net tons compared with 4,704,135 in March and with 3,137,019 in April, 1940.

The daily average output last month was 144,475 tons, a loss of 7.9 per cent from the 156,804 average of March. The operating rate in April was 89.0 per cent of capacity compared with 96.9 per cent in March. On May 1, there were 195 furnaces in blast compared with 205 furnaces in blast on April 1.

Coal strike forced out 20 furnaces, caused loss of 7.9% or nearly 250,000 tons

Bethlehem Steel blew in one Cambria unit and Struthers Iron & Steel blew in its furnace.

Among the furnaces blown out or banked were: One Carrie, one Duquesne, one Ohio, of Carnegie-Illinois Steel Corp.; one Lorain, National Tube Co.; one Swede, Alan Wood Steel Co.; one Eliza, Jones & Laughlin Steel Corp.; one Monessen, Pittsburgh Steel Co.; one Mary, Sharon Steel Corp.; one Haselton, one River, Republic Steel Corp.; one Campbell, Youngstown Sheet & Tube Co., and one Shenango, Shenango Furnace Co. Some of these furnaces have gone into blast since May 1.

Production of Coke Pig Iron and Ferromanganese

	Pig Iron*		Ferro-Mn†	
	1941	1940	1941	1940
January	4,663,695	4,032,022	35,337	43,240
February	4,197,872	3,311,480	33,627	38,720
March	4,704,135	3,270,499	55,460	46,260
April	4,334,267	3,137,019	56,871	43,384
May	.....	3,513,683	.....	44,973
June	.....	3,818,897	.....	44,631
½ year	.....	21,083,600	.....	261,208
July	.....	4,053,945	.....	43,341
August	.....	4,238,041	.....	37,003
September	.....	4,176,527	.....	33,024
October	.....	4,445,961	.....	32,270
November	.....	4,403,230	.....	31,155
December	.....	4,547,602	.....	35,666
Year	.....	46,948,906	.....	473,667

*These totals do not include charcoal pig iron. †Included in pig iron figures.

Daily Average Production of Coke Pig Iron

	1941	Per Cent Capacity	1940	Per Cent Capacity
January	150,441	95.5*	130,061	85.8
February	149,924	95.2	114,189	75.1
March	151,745	96.9	105,500	68.9
April	140,310	89.0	104,567	68.6
May	.....	...	113,345	74.8
June	.....	...	127,297	83.9
½ year	.....	...	115,844	76.1
July	.....	...	130,772	86.3
August	.....	...	136,711	90.4
September	.....	...	139,218	92.2
October	.....	...	143,418	94.8
November	.....	...	146,774	97.1
December	.....	...	146,697	97.2
Year	.....	...	128,276	84.6

*Revised for capacity as of Dec. 31, 1940.

Merchant Iron Made, Daily Rate

	1941	1940	1939
January	20,812	16,475	11,875
February	21,254	14,773	10,793
March	23,069	11,760	10,025
April	20,434	13,656	9,529
May	.....	16,521	7,883
June	.....	13,662	8,527
July	.....	16,619	9,404
August	.....	17,395	11,225
September	.....	17,571	12,648
October	.....	18,694	16,409
November	.....	22,792	16,642
December	.....	19,779	16,912

Production by Districts and Coke Furnaces in Blast (In Net Tons)

	April, 1941	Daily % of Capacity	March, 1941	Daily % of Capacity	April, 1940	May 1, 1941 No. in Blast	May 1, 1941 Operating Rate	April 1, 1941 No. in Blast	April 1, 1941 Operating Rate
Eastern	35,535	100.4	38,862	106.4	.....	2	1,185	2	1,255
Buffalo	266,306	90.5	269,335	88.7	195,963	12	8,875	12	8,700
Philadelphia	383,263	87.5	402,094	91.0	360,688	16	12,470	17	12,970
Ferro. and Spiegel	16,904	106.6	18,831	114.0	10,914	4	565	4	605
Pittsburgh	1,035,357	87.0	1,134,173	95.3	735,382	43	33,440	46	36,585
Ferro. and Spiegel	34,372	81.9	34,367	79.3	41,972	4	1,145	4	1,110
South Ohio River	94,516	89.7	102,071	93.8	72,595	7	3,150	7	3,295
Valleys	519,568	81.0	557,946	101.0	297,766	19	15,270	23	18,845
Wheeling	201,274	107.5	218,750	106.5	164,075	9	7,120	9	7,055
Cleveland	369,281	84.8	418,684	103.0	247,420	15	11,160	17	13,560
Chicago	931,378	90.9	1,002,502	94.7	579,800	37	31,045	37	32,340
St. Louis	.....	...	.....	...	.....	0	.....	0	.....
Detroit	93,939	83.6	115,955	99.9	107,049	5	3,130	5	3,740
Western	67,730	111.5	67,793	107.8	62,996	4	2,260	4	2,185
Southern	279,249	96.9	320,510	107.7	255,321	16	9,310	17	10,340
Ferromanganese	5,595	62.0	2,262	25.2	5,078	2	185	1	75
Total	4,334,267	89.0	4,704,135	96.9	3,137,019	195	140,310	205	152,750

George K. Leet Resigns As U. S. Steel Secretary

• • • **George K. Leet,** secretary of United States Steel Corp., and for many years a prominent figure in the steel industry, has retired after 30 years of service. Mr. Leet held the office of secretary for more than 19 years and retired under the corporation's pension plan. William Averell Brown, assistant general solicitor of U. S. Steel since 1918, was elected secretary to succeed Mr. Leet. All other officers of the corporation were re-elected.

Mr. Leet joined the U. S. Steel in 1911 as secretary to the late Judge Gary. Among Mr. Leet's important duties during his many years of close association with Judge Gary was that of press liaison for the late chairman of the board.

Mr. Brown was born in Cooperstown, N. Y., Sept. 28, 1885. He was educated at Harvard University. After graduating, he entered the law office of Bowers & Sand in New York and remained there until 1917, when he joined the law department of the U. S. Steel. A year later he was made assistant general solicitor, a position he has since held.

Personals

Change is inevitable in progressive Industry. Change is constant.

• **Wilfred Sykes** has been elected president of the Inland Steel Co., Chicago, succeeding **Philip D. Block.** Mr. Sykes has been assistant to the president in charge of operations since 1930 and a director of the company since 1935. His association with Inland began in 1923 when he was employed to take charge of construction and engineering work. From 1927 to 1930 he served as assistant general superintendent of the Indiana Harbor works. He is also chairman of the Milcor Steel Co. and of the Wilson & Bennet Mfg. Co., two of Inland's subsidiary organizations.

Mr. Block, who has been president of Inland for the past 22 years, was elected chairman of the executive committee. **L. E. Block,** who served as chairman of the board for many years prior to 1940, has been made chairman of the finance committee. **James H. Walsh** has been named vice-president of the steel works. He had been works manager of the Indiana Harbor works since 1930 and was general superintendent of this plant from 1927 to 1930.

• **John A. Dillon** has been elected vice-president of the O. C. Duryea Corp., 30 Rockefeller Plaza, New York, manufacturer of the Duryea cushion underframe for railroad freight cars, and will have charge of sales to railroads east of Chicago. Mr. Dillon was formerly vice-president of the Pittsburgh Screw & Bolt Corp., Pittsburgh, in charge of Eastern sales, having been connected with that company for about 20 years.

• **Howard M. Dawson** of the Cleveland office of the Jessop Steel Co., Washington, Pa., has been transferred to the Detroit office. **D. J. Hanna** is branch manager of the new Detroit warehouse and office at Woodbridge and Walker Streets.

• **A. H. Frauenthal,** vice-president and general manager for the past five years of the Bantam Bearings Corp., South Bend, Ind., has resigned in order to establish a new factory in Muskegon to manufacture large special roller and ball bearings. Mr. Frauenthal had been associated with the General Electric Co., the Chandler Motor Car Co. and the Studebaker Corp. before going to Bantam in 1930. Succeeding Mr. Frauenthal is **R. B. Nichols** who has been secretary and sales manager, as well as assistant to Mr. Frauenthal.

• **Robert T. Bowman** has been appointed director of public relations of the John A. Roebling's Sons Co., Trenton. Mr. Bowman served three years as president of the New Jersey State Chamber of Commerce before accepting his present position.

• **Walter D. Briggs,** New York, and **Arthur J. Moore,** Chicago, have been appointed district sales distributers, Drafto Co., Cochranton, Pa.

Emil J. Lever, of Centerbridge, Pa., former field director of the Steel Workers' Organizing Committee, has been appointed field representative of the labor supply and training section of the OPM's labor division.

WILFRED SYKES, president, Inland Steel Co., Chicago.

PHILIP D. BLOCK, chairman of the executive committee of Inland Steel Co.

JAMES H. WALSH, vice-president of the steel works, Inland Steel Co.

WILLIAM W. HOLLOWAY, chairman of the board, Wheeling Steel Corp., Wheeling, W. Va.

• **F. J. Whitgrove,** superintendent of the DeKalb, Ill., Works of American Steel & Wire Co., Cleveland, retired April 30 after 50 years of service with the company and its predecessors. Born in England in 1877, Mr. Whitgrove began his business career in 1891 as office boy for Lambert & Bishop Wire & Fence Co., Joliet, Ill., now the Scott Street works of American Steel & Wire. In 1902 he was transferred to the Rockdale works, Joliet, as superintendent's clerk and later became assistant superintendent. In 1908 he was promoted to superintendent of the Scott Street works, which position he held until 1913 when he was transferred to DeKalb as superintendent, holding that position until his retirement.

F. J. WHITGROVE, superintendent of the DeKalb Works of American Steel & Wire Co., Cleveland, who has retired.

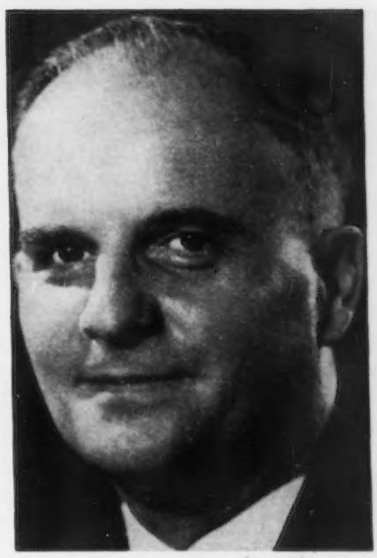
• **William W. Holloway,** president of the Wheeling Steel Corp., Wheeling, W. Va., was elected chairman of the board, succeeding the late Alexander Glass. **Archie J. McFarland,** who has been executive vice-president, was elected president. **Arthur C. Stifel,** a director, was elected to the executive committee and **L. Woodward Franzheim,** vice-president and treasurer, has been made a director.

• **Austin W. Clark** has been elected vice-president of the National Supply Co., Pittsburgh. Previous to joining National Supply in 1940 as assistant vice-president, Mr. Clark had been associated for four years with Sears, Roebuck & Co., Chicago, as assistant comptroller. Prior to that time, he was for 14 years with the Hearst publications in New York as comptroller and treasurer, and was also with the Cerro de Pasco Copper Corp. in Peru for four years.

AUSTIN W. CLARK, vice-president of the National Supply Co., Pittsburgh.

ARCHIE J. McFARLAND, president, Wheeling Steel Corp.

• **L. Clayton Hill** has been named to the post of vice-president and general manager of Murray Corp. of America, Detroit. After his graduation from the University of Michigan in 1911, Mr. Hill acquired extensive practical engineering and manufacturing experience in the automotive and aircraft industries, much of his work in the latter category being for Packard and that company's



L. CLAYTON HILL, vice-president and general manager of Murray Corp. of America, Detroit.

output of aviation engines built during the first World War. Following the Armistice, Mr. Hill served as assistant general manager of the Society of Automotive Engineers until 1925. In 1927 he joined Murray, where he served in various engineering and manufacturing capacities, until 1933 when he became works manager and still later vice-president in charge of all manufacturing activities.

Dr. John Kenneth Galbraith, economics professor at Princeton University, has been appointed director of the price division, Office of Price Administration and Civilian Supply. Dr. Galbraith is author of "Modern Competition and Business Policy" and in 1938 and 1939 directed the public works survey for the National Resources Planning Board.

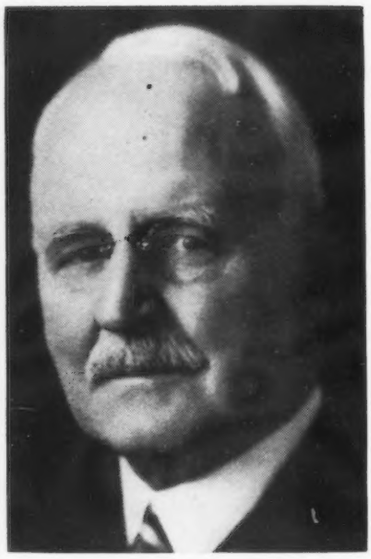
• **Herbert Beik,** for 10 years district manager at New York for North American Mfg. Co., Cleveland, has been transferred to Chicago as sales engineer. **N. H. Davies,** who served six years in the Chicago office, has assumed the post of assistant sales manager in the main office at Cleveland. **John Watson,** formerly of the Pittsburgh office, is now district manager at New York. Mr. Watson was assistant manager at Pittsburgh. **Otto Bernhard,** vice-president of the company, who has been at Pittsburgh for approximately 15 years, is district manager of the company's operations there.

• **Charles T. Siebert, Jr.,** formerly assistant treasurer and credit manager, has been made assistant to the vice-president in charge of sales of the Carnegie-Illinois Steel Corp., Pittsburgh. Other appointments include: **R. J. Phipps** as credit manager, Eastern area; **R. W. Hyde,** credit manager and **H. S. Gray** and **F. H. Becker** assistant credit managers of Western areas.

• **John J. Fitzpatrick** has been put in charge of the new munitions division of the Armstrong Cork Co., Lancaster, Pa., with the title general manager. Mr. Fitzpatrick is a graduate engineer of Kentucky State College and for many years was in charge of Armstrong operations in Spain.

• **Frank Campbell Coe** has been put in charge of the American K. A. T. Corp.'s Philadelphia office in the Commercial Trust Building.

Obituary



THE LATE J. G. Rumney, chairman of the board, Detroit Steel Products Co., Detroit.

• **John G. Rumney,** chairman of the board of Detroit Steel Products Co., which he founded in 1904, and president of the Fenestra Construction Co., died recently. Mr. Rumney, a native of Detroit, was 90 years old. He was first employed by Tefft, Casey & Kellogg and later by Ducharme Fletcher & Co. Subsequently he was treasurer of the Henry C. Hart Mfg. Co., and from 1888 to 1896 was engaged in the cattle and real estate business in Helena, Mont. Returning to Michigan, he became manager of the American Radiator Corp. and of the Kalamazoo Spring & Axle Co. His son, Mason D. Rumney, is vice-president of Detroit Steel Products Co.

• **Jacob Pauly,** assistant manager of the order department of Inland Steel Co., died April 26. Mr. Pauly was born in Chicago 47 years ago. He became associated with Inland Steel Co. in 1922, and became assistant manager of the order department in 1934.

• **Francis Edwin Brown,** chairman of David Brown & Sons, Ltd., Huddersfield, England, and its associated companies, died recently at his home in Holmfirth, England. He was 67 years old. Mr. Brown joined the company, which was founded by his father, as an apprentice in 1889. During his management, the company acquired the Keighley Gear Co., then P. R. Jackson & Co., Ltd., and Salford Rolling Mills, and developed alloy steel foundries at Penistone. Mr. Brown was a pioneer in the development of machine cut gearing.

• **J. Watson Owings,** metallurgist for the Meehanite Metal Corp., Pittsburgh, died recently in Spokane, Wash. Mr. Owings had been with the company since 1936 and had spent his entire business career in the foundry industry. He was 56 years old.

• **Raymond A. Young,** aged 40 years, president of Young Sales, Inc., Milwaukee, welding supply firm, died April 22 in Milwaukee after an illness of three weeks. He was a graduate of the University of Wisconsin and began his business career with the Wisconsin Telephone Co. at Milwaukee, later becoming associated with the Rajaz Auto Spring Co. He organized the firm of which he was president in 1937 with his brother, Willard A. Young.

• **Charles John Walsh,** managing director of United Steel Companies, England, and of a subsidiary, the Appleby-Frodingham Iron & Steel Co., died recently at Retford, England. He was a past Master Cutler of Sheffield and before joining the United Steel combine was managing director of Ibbotson Brothers & Co., Sheffield.

• **Milton W. St. John,** aged 52 years, manager of sales, by-products, Jones & Laughlin Steel Corp., Pittsburgh, died May 1. Mr. St. John came to Jones & Laughlin in 1919. He was a graduate of New York University, School of Chemical Engineering.

• **George H. Danner,** president and general manager of Pittsburgh Piping & Equipment Co., Pittsburgh, died at the age of 66 years, on April 11, in Pittsburgh. Mr. Danner was one of the founders of the company and had served as president since its organization nearly 40 years ago.

• **Samuel O. Vancleve,** head of the Elms Brothers Machine Shop, Waynesburg, Pa., died April 28 at Waynesburg.

Steel Production Figures for 1940

In Net Tons. Source: American Iron and Steel Institute

ANNUAL STEEL PRODUCTION (Ingots and steel for castings)

Years	Open hearth			Bessemer	Crucible	Electric	Total
	Basic	Acid	Total				
1915	24,985,772	1,534,822	26,520,594	9,281,678	127,436	79,452	36,009,160
1920	35,140,810	1,451,712	36,592,522	9,949,057	80,937	566,370	47,188,886
1925	41,537,823	1,060,804	42,598,627	7,530,837	21,910	689,373	50,840,747
1929	52,900,309	1,254,926	54,155,235	7,977,210	7,442	1,065,603	63,205,490
1930	38,380,514	874,559	39,255,073	5,639,714	2,523	686,111	45,583,421
1931	24,786,046	424,668	25,210,714	3,386,259	1,733	460,255	29,058,961
1932	13,151,804	184,406	13,336,210	1,715,925	722	270,044	15,322,901
1933	22,464,004	363,469	22,827,473	2,720,246	763	471,747	26,020,229
*1934	26,047,187	307,651	26,354,838	2,421,840	595	404,651	29,181,924
1935	34,004,585	396,695	34,401,280	3,175,235	719	606,471	38,183,705
1936	48,288,605	471,858	48,760,463	3,873,472	914	865,150	53,499,999
1937	51,265,211	559,768	51,824,979	3,863,918	1,046	947,002	56,636,945
1938	28,774,999	305,017	29,080,016	2,106,340	7	565,627	31,751,990
1939	47,828,700	581,100	48,409,800	3,358,916	931	1,029,067	52,798,714
1940	60,882,840	690,243	61,573,083	3,708,573	1,024	1,700,006	66,982,686

PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS

Years	Ingots	Castings	Total	Years	Ingots	Castings	Total
1915	1,034,041	109,644	1,143,685	*1934	1,787,009	18,739	1,805,748
1920	1,782,972	76,555	1,859,527	1935	2,337,918	36,099	2,374,017
1925	2,598,837	126,093	2,724,930	1936	3,122,672	106,985	3,229,657
1929	4,216,001	216,071	4,432,072	1937	3,332,670	63,871	3,396,541
1930	2,595,245	141,263	2,736,508	1938	1,606,977	46,533	1,653,510
1931	1,529,931	100,692	1,630,623	1939	3,120,859	91,096	3,211,955
1932	848,467	45,969	894,436	1940	4,854,738	111,149	4,965,887
1933	1,652,448	80,397	1,732,845				

PRODUCTION OF HOT ROLLED IRON AND STEEL PRODUCTS IN 1940

	Net tons
FLAT ROLLED PRODUCTS:	
Plates (sheared and universal)	4,323,408
Sheets	11,705,956
Strip	2,077,744
Hoops	97,074
Cotton ties and baling bands	44,918
Strip and sheets for cold reduced black plate and tin plate	3,103,627
Black plate	521,924
Total	21,874,651
BARS:	
Merchant	6,459,263
Concrete reinforcement	1,425,998
Total Bars	7,885,261
Structural shapes	4,232,346
Sheet piling	186,125
Rails	1,678,986
Long splice bars, tie plate bars, etc.	515,928
Skelp	2,709,000
Blanks or pierced billets for seamless tubes	2,320,966
Wire rods	4,351,848
Car wheels (rolled steel)	191,102
Cross ties	13,478
Rolled forging blooms, billets and axle blanks	919,826
Blooms, billets, slabs and sheet bars for export	1,677,905
All other finished hot rolled products	102,947
Total	18,900,457
Grand total	48,660,369

*The figures for 1934 and subsequent years include only that portion of the steel for castings which was produced in foundries operated by companies producing steel ingots.
†Revised.

PRODUCTION OF FLAT HOT ROLLED PRODUCTS BY CLASSES

	1937	1938	1939	1940
PLATES:				
Universal	936,573	382,629	690,128	762,644
Sheared	2,695,865	1,537,206	2,411,853	3,560,764
TOTAL	3,632,438	1,919,835	3,101,981	4,323,408
Black sheets	8,780,247	* 5,794,888	*10,032,076	11,705,956
Hoops	115,284	74,578	72,971	97,074
Cotton ties and baling bands	70,017	38,127	34,580	44,918
Strip	3,243,028	1,153,861	1,826,696	2,077,744
Strip and sheets for cold reduced black plate and tin plate	.....	* 1,400,395	* 2,670,496	3,103,627
TOTAL	12,208,576	* 8,461,849	*14,636,819	17,029,319
BLACK PLATE:				
For tinning and terne plate	2,923,631	702,778	670,729	395,552
All other	384,945	88,732	* 127,133	126,372
TOTAL	3,368,576	791,510	* 797,862	521,924
GRAND TOTAL	19,149,590	*11,173,194	*18,536,662	21,874,651

PRODUCTION OF TIN PLATE AND TERNE PLATE

Years	Tin plate	Terne plate	Total
1925	1,729,288	45,532	1,774,820
1929	2,034,170	43,503	2,077,673
1930	1,859,564	23,055	1,882,619
1931	1,559,294	17,451	1,576,745
1932	1,104,563	12,188	1,116,751
1933	1,888,125	21,245	1,909,370
1934	1,683,268	36,941	1,720,209
1935	1,898,578	98,382	1,996,960
1936	2,355,531	142,303	2,497,834
1937	2,708,373	161,610	2,869,983
1938	1,601,679	127,827	1,729,506
1939	2,505,636	181,537	2,687,173
1940	2,572,558	166,023	2,738,581

PRODUCTION OF FINISHED PRODUCTS ROLLED FROM OLD MATERIAL

Products	1937	1938	1939	1940
Rails	37,474	16,771	24,666	45,511
Structural shapes	150,537	74,801	97,677	105,328
Merchant bars	206,704	151,108	240,781	203,041
Bars for reinforced concrete work	187,377	150,569	216,666	160,597
Hot rolled strip	7,908	3,917	2,284	1,016
Long angle splice bars & tie pl. bars	23,183	3,157	6,884	9,004
Cross ties	2,867	2,119	3,024	4,285
All other rolled products	30,194	9,572	40,226	36,005
Total	646,244	412,014	632,208	564,787

The Iron Age Comparison of Prices

Advances Over Past Week in Heavy Type; Declines in Italics

	May 6, 1941	Apr. 29, 1941	Apr. 8, 1941	May 7, 1940
Flat Rolled Steel:				
(Cents Per Lb.)				
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Tin and Terne Plate:				
(Dollars Per Base Box)				
Tin plate	$5.00	$5.00	$5.00	$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30
Bars and Shapes:				
(Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Wire and Wire Products:				
(Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails:				
(Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel:				
(Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Wire Rods and Skelp:				
(Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

	May 6, 1941	Apr. 29, 1941	Apr. 8, 1941	May 7, 1940
Pig Iron:				
(Per Gross Ton)				
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$24.84
No. 2, Valley furnace	24.00	24.00	24.00	23.00
No. 2, Southern Cin'ti	24.06	24.06	24.06	23.06
No. 2, Birmingham	20.38	20.38	20.38	19.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	23.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	24.34
Basic, Valley furnace	23.50	23.50	23.50	22.50
Malleable, Chicago†	24.00	24.00	24.00	23.00
Malleable, Valley	24.00	24.00	24.00	23.00
L. S. charcoal, Chicago	30.34	30.34	30.34	30.34
Ferromanganese‡	120.00	120.00	120.00	100.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

Scrap:				
(Per Gross Ton)				
Heavy melting steel, P'gh.	$20.00	$20.00	$20.00	$17.25
Heavy melt'g steel, Phila.	18.75	18.75	18.75	16.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	16.25
Carwheels, Chicago	....	....	....	17.75
Carwheels, Philadelphia	....	....	....	20.25
No. 1 cast, Pittsburgh	23.25	23.25	....	17.75
No. 1 cast, Philadelphia	24.00	24.00	23.75	20.25
No. 1 cast, Ch'go,*	22.60	22.60	22.60	15.75

*Changed to gross ton basis.

Coke, Connellsville:				
(Per Net Ton at Oven)				
Furnace coke, prompt	$5.625	$5.625	$5.625	$4.00
Foundry coke, prompt	6.25	6.25	6.25	5.25
Non-Ferrous Metals:				
(Cents per Lb. to Large Buyers)				
Copper, electro., Conn.*	12.00	12.00	12.00	11.50
Copper, Lake, New York	12.00	12.00	12.00	11.50
Tin (Straits), New York	52.00	51.75	51.75	47.625
Zinc, East St. Louis	7.25	7.25	7.25	5.75
Lead, St. Louis	5.70	5.70	5.70	4.85
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

*Mine producers only.

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 143-152 herein.
On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Composite Prices

	FINISHED STEEL	PIG IRON	SCRAP STEEL
May 6, 1941	2.261c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.261c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.261c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.211c. a Lb.	$22.61 a Gross Ton	$16.75 a Gross Ton

	High	Low	High	Low	High	Low
1941			$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.261c., Jan. 2	2.211c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.286c., Jan. 3	2.236c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.512c., May 17	2.211c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.236c., May 28	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08. Dec. 3

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Summary of the Week

• Heavy defense requirements and railroad orders, plus strict inventory control imposed by OPM, will tend to restrict non-defense consumption of steel . . . Recovery from effects of coal strike more rapid than expected . . . Pig iron loss 248,233 tons

RECENT developments point more clearly than anything which has gone before to the probability that supplies of steel for non-defense manufacturing will be more closely restricted.

These developments are: Inventory control over 16 metals, including rolled, drawn and forged steel, castings and pig iron imposed by the Division of Priorities, Office of Production Management; President Roosevelt's appeal for a speeding up of armament production to 24 hours a day, seven days a week; arrival of the time when many newly built defense plants are ready to go into production and will have to be supplied with steel; a sudden awakening to the fact that the railroads must be supplied with a large volume of new equipment if they are to be able to handle the greatly expanded volume of traffic now expected.

THE inventory control plan is the most drastic effort Washington has taken to avoid more widespread use of mandatory priorities. In addition to steel, it covers antimony, cadmium, chromium, cobalt, copper, all types of ferrous alloys, iridium, lead, manganese and spiegeleisen, mercury, molybdenum, all types of non-ferrous alloys, tin, vanadium and the scrap containing any of these metals.

Starting June 10, monthly affidavits will be required from every user as to the state of his inventory, and no supplier will be permitted to ship any of these materials until such sworn inventory statement shall have been received. Supplies will be withheld from those whose inventories have become larger than required for efficient operations.

THE speeding up of the defense program and of aid to Britain will superimpose on already overcrowded steel mill order books a large tonnage for which rolling schedules can be found only by the displacement of less important non-defense orders. One of the pending requirements is not less than 4,000,000 tons of shell steel. Even though delivery of this steel will be spread over a considerable period, the problem of allocating it is nonetheless acute.

A conference in Washington last week disclosed that several million tons of steel will be required for a greatly expanded railroad buying program, which will include 120,000 cars for 1942 traffic and 150,000 more for 1943. It was estimated that the railroads will require nearly 5,000,000 tons of steel, including rails and track supplies, over the remainder of this year. Two car building plants have had to suspend operations because of delayed steel shipments and their inability to obtain priorities. Efforts are being made to obtain some sort of preference ratings on railroad steel. Several hundred thousand tons of rails for 1942 shipment have been allocated to mills.

ALTHOUGH plant construction for defense has progressed far, new projects are cropping up. For example, more than 100,000 tons of structural shapes for bearing piles will be required for three Navy projects on the Atlantic Coast. Fabricated structural steel awards, at close to 50,000 tons, second highest weekly total this year, include a bomber plant taking 26,000 tons.

The British will be back in the market for steel for June shipment and for that month will require a minimum of 200,000 to 300,000 tons. In addition, the British want U. S. mills to ship 35,000 tons of tin plate a month to British Dominions and to Portugal and the Argentine. A tin plate scarcity is already in evidence, so far as new business is concerned.

RECOVERY from the effects of the coal strike has been quicker than expected. At mid-week the industry will be operating at 97.5 per cent, three and a half points above last week. It is indicated that the 100 per cent operation of March may be attained before the end of May. Pig iron output in April was 4,334,267 net tons compared with 4,704,135 tons in March. Taking into account one less working day in April, the calculated loss caused by the coal strike was 248,233 tons. On May 1 there were 195 furnaces in blast compared with 205 on April 1, but some of the 20 that were blown out or banked have since resumed production and others will be put in shortly. The daily average production last month was 144,475 tons, or 89 per cent of capacity, against a March average of 156,804 tons, or 96.9 per cent of capacity. A tighter pig iron situation has developed.

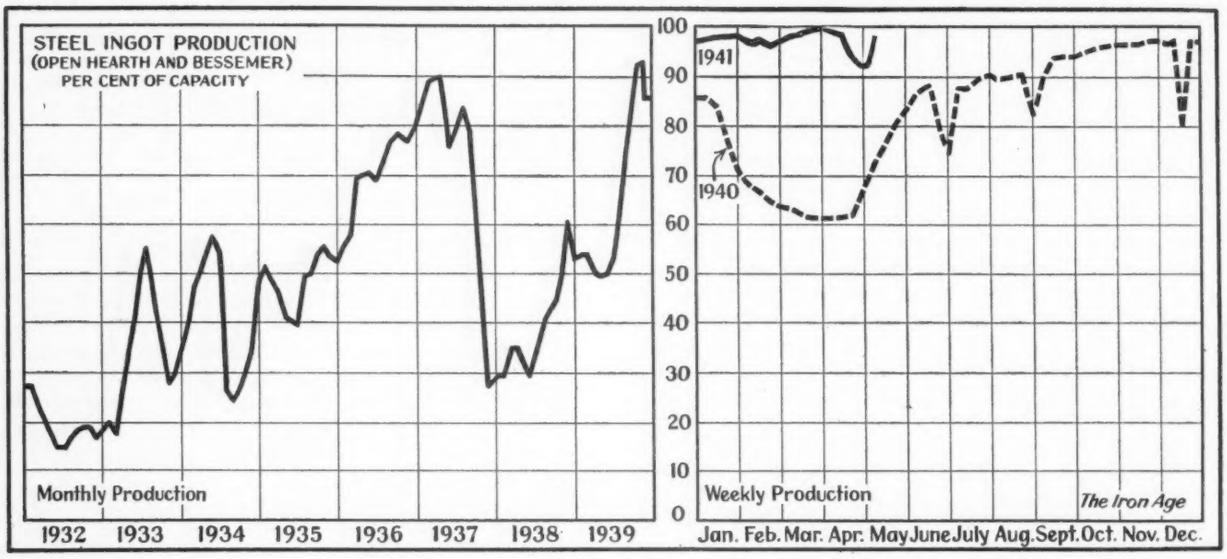
The decision of the Office of Price Administration and Civilian Supply to permit the Phoenix Iron Co. to charge 2.30c. a lb. for shapes and 2.35c. for bars at its mill, or $4 a ton above the general market level, points to a dual system of prices in which marginal producers may continue to quote higher prices than their competitors. One or two other similar cases are pending.

The Industrial Pace . . .

A RECOVERY in THE IRON AGE index of capital goods activity to 105.5 from 102.9 last week is due to high production of automobiles amounting to 130,610 units. All other components continued to decline slightly in an aftermath of the coal strike. Compared with the figures of April 5, the loss traceable to the stoppage in the coal mines, namely in steel, Pittsburgh activity and lumber, amounts to at least 64 per cent of the drop. With resumed activity next week should see a further improvement.

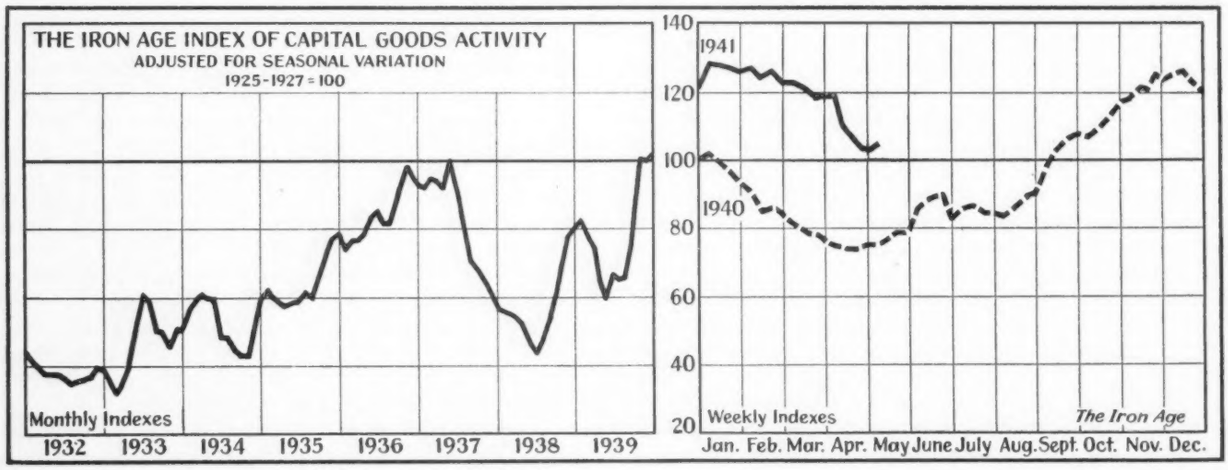
STRUCTURAL STEEL bookings rose in March from their February low of 165,371 tons to 187,143 tons. This is a 13.2 per cent rise and compares with March, 1940, bookings of 128,321 tons. The tonnage available for future fabrication is estimated at 697,197 tons. While the index numbers for manufacturers' stocks remained at a level, being 131.5 for March and 131.2 for February, new orders increased slightly from 231 to 237. When compared with March, 1940, these indices mark 14 and 121 per cent increases respectively.

Steel Production Recovers to 97.5%


STEEL INGOT PRODUCTION
(OPEN HEARTH AND BESSEMER)
PER CENT OF CAPACITY
Monthly Production
1932 1933 1934 1935 1936 1937 1938 1939
1941
1940
Weekly Production
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
100 90 80 70 60 50 40 30 20 10 0

District Ingot Production, Per Cent of Capacity	Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Buffalo	Wheel-ing	Detroit	Southern	S. Ohio River	West-ern	St. Louis	East-ern	Aggre-gate
Current Week . .	96.0	101.5	98.0	96.0	99.0	104.5	85.0	101.0	95.0	100.0	102.5	111.0	101.5	97.5
Previous Week . .	92.0	96.0	84.0	96.0	92.0	104.5	85.0	101.0	95.0	101.5	102.5	111.0	101.5	94.0

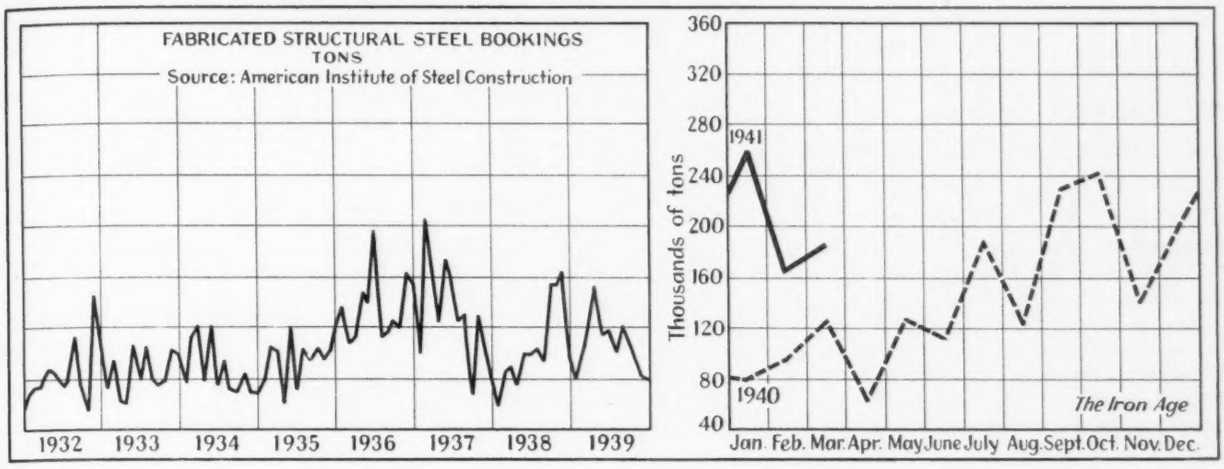
Capital Goods Index Recovers Slightly


THE IRON AGE INDEX OF CAPITAL GOODS ACTIVITY
ADJUSTED FOR SEASONAL VARIATION
1925-1927 = 100
Monthly Indexes
1932 1933 1934 1935 1936 1937 1938 1939
1941
1940
Weekly Indexes
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
140 120 100 80 60 40 20

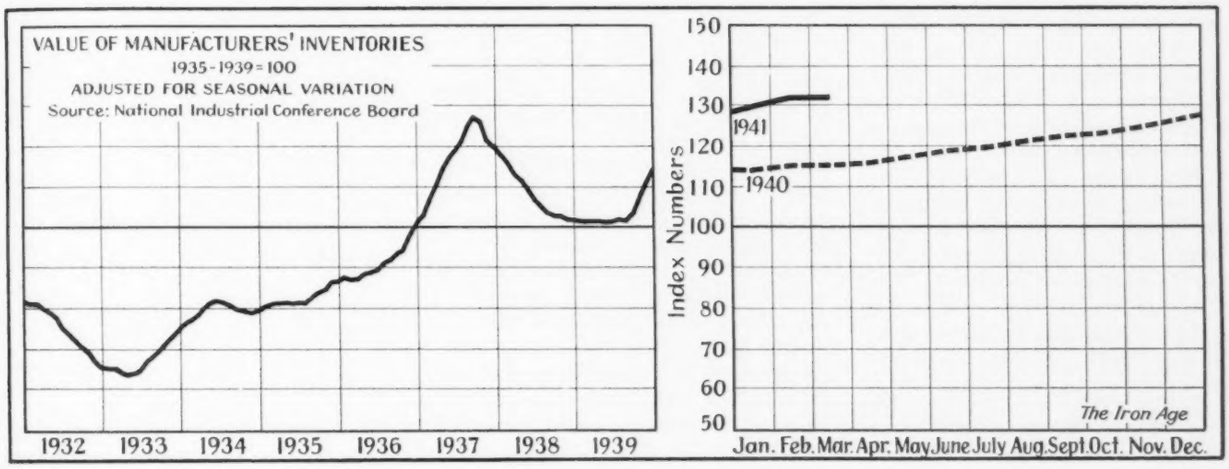
Sources: [1] THE IRON AGE; [2] Ward's Automotive Reports; [3] *Engineering News-Record*; [4] Association of American Railroads; [5] University of Pittsburgh. Indexes of forest products carloadings and activity in Pittsburgh area reflect conditions as of week ended April 26. Other indexes cover week of May 3.

Component — Week Ended →	May 3	Apr. 26	Apr. 5	May 4 1940	May 4 1929
Steel ingot production[1]	126.0	127.5	132.8	81.3	126.5
Automobile production[2]	108.1	87.7	100.1	82.3	128.7
Construction contracts[3]	128.6	132.2	152.3	65.6	127.9
Forest products carloadings[4]	71.6	72.5	72.1	59.6	117.5
Pittsburgh output and shipments[5]	93.4	94.5	127.8	83.8	123.5
COMBINED INDEX	105.5	102.9	117.0	74.5	124.8

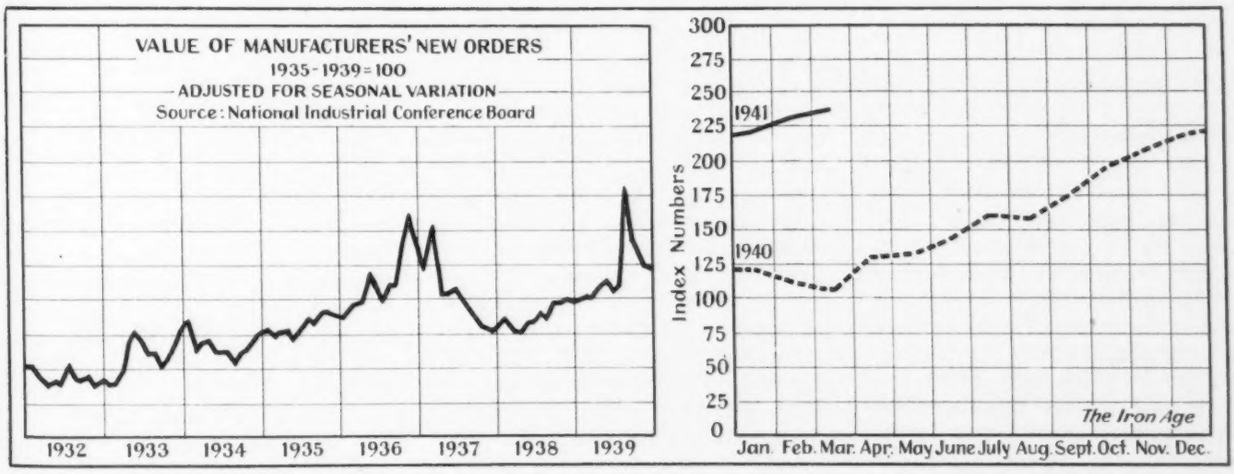
March Structural Steel Bookings Up 13.2%


FABRICATED STRUCTURAL STEEL BOOKINGS
TONS
Source: American Institute of Steel Construction
1932 1933 1934 1935 1936 1937 1938 1939
Thousands of tons
360 320 280 240 200 160 120 80 40
1941
1940
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

Manufacturers' Stocks Maintained in March


VALUE OF MANUFACTURERS' INVENTORIES
1935-1939=100
ADJUSTED FOR SEASONAL VARIATION
Source: National Industrial Conference Board
1932 1933 1934 1935 1936 1937 1938 1939
Index Numbers
150 140 130 120 110 100 90 80 70 60 50
1941
1940
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

New Orders Continue to Increase


VALUE OF MANUFACTURERS' NEW ORDERS
1935-1939=100
ADJUSTED FOR SEASONAL VARIATION
Source: National Industrial Conference Board
1932 1933 1934 1935 1936 1937 1938 1939
Index Numbers
300 275 250 225 200 175 150 125 100 75 50 25 0
1941
1940
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

Market News

. . . THE WEEK'S ACTIVITIES IN IRON AND STEEL

New Business

. . . Shipbuilding and car building programs complicate deliveries

Tonnages booked at PITTSBURGH in the past week have been as heavy as in the past several weeks. The injection of the shipbuilding program into finishing mill schedules and the probability of a heavy influx of freight car material soon earmarks plate and structural capacity for months to come. PITTSBURGH hears that the automobile makers, with steel to be shipped to them between now and Aug. 1, expect to maintain the present level of motor car production through the end of the year. Actual assemblies, it is said, will probably not be curtailed until January, 1942, even though the volume of steel specifications may be reduced by 20 per cent after Aug. 1. The ability of the automobile industry to obtain enough steel to maintain record breaking production has caused considerable rumbling among both steel makers and other steel consumers.

Recent developments at CLEVELAND and YOUNGSTOWN show the steel industry now entering a far more active phase in connection with the national defense program, a phase where the emphasis is on finished steel more and more. The big new plants built in recent months are on the verge of calling for heavy daily shipments. Production runs on defense business by finishing mills are becoming longer. Meanwhile, future requirements of the government program are being stepped up liberally.

A new wave of railroad purchases is expected; tin plate shipments are heavy and production is at a peak; and a record year on line pipe construction appears likely. The most indigestible situation exists in the market for steel plates but a national survey of orders is being made which may point the way toward better alinement of production facilities.

Testifying to the strong situation, a CLEVELAND company cleaning up discarded odds and ends from its steel mills was surprised to find vigorous demand for practically all items at the full market price.

A noticeable increase of bookings for 1942 is occurring at CHICAGO. Defense orders have tightened the plate and structural shape situation. Large orders for piling and concrete bars were received during the week. The tonnage of sheets for Army housing projects grows larger.

Backlogs continue to mount at BIRMINGHAM. Bars and plates, particularly plates for shipbuilding are in heaviest demand with bookings for sheets and wire products not far behind. Mills have tonnages on their books that cannot be delivered until 1942.

The volume of new orders taken in the past week in the PHILADELPIA area was fully equal to the peak levels of March and April. Steel requirements for six Navy cruisers were distributed between two large producers in the past week. Railroad buyers are actively endeavoring to step up the rate of steel shipments against their car programs. Finished steel allotments to district steel offices in May will be lower than had originally been scheduled due to several open hearths unexpectedly being forced out of operation for repairs. Killed steel is growing progressively more difficult to obtain due to tightness in ferrosilicon supplies.

Steel officials are amazed at the lack of understanding of the defense program requirements among some steel consumers. It is said that some manufacturers are now making plans for 1942 commercial production on the same basis as 1941. Apparently it is unknown in some quarters that defense requirements for steel are piling up so rapidly it is definite that much less steel will be available for commercial consumption in 1942 than during 1941. Estimates on the amount of steel needed for direct and indirect defense requirements are constantly being revised upward.

Steel Operations

. . . Industry rate jumps to 97.5 per cent from 94 per cent last week

With the settlement of the coal strike and the resumption of coke making and pig iron production, steel ingot operations this week recovered part of the loss caused by the cessation of coal mining. At mid-week output of ingots for the industry as a whole will be not less than 97.5 per cent, up three and a half points from last week. A further recovery is indicated for next week, though it may be two or three weeks before the industry can attain the 100 per cent rate of March.

Sharpest gain in production was in the YOUNGSTOWN area, which rose 14 points to 98 per cent. CLEVELAND gained seven points to 99 per cent, CHICAGO five and a half points to 101.5 per cent and PITTSBURGH four points to 96 per cent. Other districts had not been seriously affected by the coal strike.

Semi-Finished Steel

. . . Mills having difficulty meeting requirements

Despite record breaking production, hard pressed blooming and slabbing mills are somewhat behind on shipments. The volume of incoming orders remains somewhat heavier than production. Ship plate and freight car programs are expected to earmark an increasingly larger share of capacity and subsequently an expected influx of ordnance material will further add to the complexity of schedules.

Iron Ore

. . . April movement of 6,954,793 tons a record

While iron ore consumption declined in April, a record movement of ore on the Great Lakes was under way. Shipments totaled 6,954,793 gross tons, far greater than in any previous April. One year ago the movement in April was only 464,669 tons.

Pig Iron

. . . Supplies tighter as result of coal strike

Pittsburgh reports pig iron supplies tighter than ever with some pig iron consumers going a long distance for supplies. In some of the latter cases it is said the iron is sold f.o.b. the furnace, the user absorbing the freight. Three furnaces in the PITTSBURGH district out of the five banked because of the coal strike are back into production, one is being held down for repairs, and another one is scheduled to return into operation this week.

Stacks affected at CLEVELAND by the coal strike were returning to normal at the start of this week. In the YOUNGSTOWN area resumption of operations by banked furnaces has been exceptionally rapid. However, three stacks taken off for repairs at YOUNGSTOWN during the strike are still out of blast.

The pig iron situation in Eastern Pennsylvania is growing more critical, with little relief in sight. Shipments are generally being allotted on the basis of 1940 needs, but this method is causing some inequalities due to the general poor level of operations in certain types of foundries last year and will probably be revised shortly on the basis of actual current requirements. Chief factor in any new arrangement will be amount of defense work being done. Defense officials are still studying the possibility of blowing in the Chester and Riddlesburg, Pa., furnaces, but are experiencing some difficulty in establishing raw material sources.

The CHICAGO district did not suffer from the coal strike as much as others. Only plant forced to bank furnaces was Carnegie - Illinois, which now has its usual quota of 21 out of 23 in blast again.

One blast stack in the BUFFALO district was blown out in the last week for relining but two rebuilt stacks are on the verge of being blown in to replace it. The stack blown out last Saturday is one of two at the Republic Steel Corp.'s plant; of the two ready for relighting, one at the Wickwire Spencer Steel Co. "may be blown in before the end of this week," a company spokesman announced; the other at the Hanna Furnace Corp. will be ready for relighting about June 1. Both these latter stacks have been inactive for a period of several years because of their bad state of disrepair. The blast furnace shut down at the Republic plant will be relined and ready for service again in about three weeks.

Granite City Steel Co. will buy the production of pig iron of one of the two furnaces of the Granite City Pig Iron Co., which have been taken over by the Koppers Co. of Pittsburgh, it was announced by Hayward Niedringhaus, president of the steel company. Mr. Niedringhaus said that the pig iron would be taken in the form of hot metal, as his company has its own track into the plant of the pig iron company and has its own ladle cars and locomotives.

Reinforcing Steel

. . . New projects nearly 13,000 tons, awards 8410 tons

Reinforcing steel awards total 8410 tons. The largest lettings include 2000 tons for a project at Fort Crook, Omaha, Neb.; 1400 tons for the Studebaker airplane engine plant at Chicago, and 1000 tons for the Plum Brook ordnance plant, Sandusky, Ohio.

New reinforcing steel projects call for 12,915 tons. Sizable inquiries are 5700 tons for the Santa Fe Dam at Azusa, Cal.; 1700 tons for substructures for the Washita River and Rock Creek bridges at Durant, Okla., and 1400 tons for a housing project at Providence, R. I.

Wire Products

. . . Production high, yet backlogs are accumulating

Manufacturers' wire and merchant wire products are in greater demand than a month ago, production is at top level, and backlogs are being built up further, according to PITTSBURGH reports.

Production continues high on all items at CLEVELAND. In order to insure ample supplies of welding wire, one large maker of welding rods is pressing aggressively for help from Washington. All users of this type of wire foresee increasing difficulty on deliveries. On certain types substitutions are impossible. Allotments have been arbitrarily cut down in a few instances lately.

Prices

. . . Phoenix Iron Co. granted permission to charge above general market

A dual price system on steel was established by the Office of Price Administration and Civilian Supply in its announcement last Friday that it had granted permission to the Phoenix Iron Co., Phoenixville, Pa., to fix ceiling base prices of 2.30c. and 2.35c. on structural shapes and merchant steel bars, respectively. These prices are $4 a net ton over those fixed in the price freezing order of April 17, establishing ceiling levels at those quoted by the Carnegie - Illinois Steel Corp. as of March 31, which were quoted by most other companies. It is said to be the belief of the OPACS that the dual price system will be considerably restricted since use of the higher prices will be granted only to marginal producers.

Action in the Phoenix case was taken in response to a petition filed by the company on April 23 asking relief from the price schedules. The ceiling prices it has been permitted to quote, retroactive to all sales closed on or after April 17, are, Price Administrator Leon Henderson said, the approximate base prices at which the company closed sales during the five weekly periods ended in March. Hence, it was pointed out, the company merely has been authorized to charge the same prices it has already been charging. Adherence to the April 17 schedule, Mr. Henderson stated, would have forced Phoenix to cut its prices since it had been charging more than the industry generally.

"Examination of the company's books by OPACS officials showed that such a reduction would have forced the company to operate at a loss," Mr. Henderson announced. "No question of absorbing or passing on wage rate increases is involved in the case."

Two other steel companies have pending before the OPACS petitions similar to that presented by Phoenix. They are the Central Iron & Steel Co., Harrisburg, Pa., and the Andrews Steel Co., Newport, Ky. OPACS has examined Central's books but has not as yet inspected the books of the Andrews company. The Apollo Steel Co. is also re-

ported to have made a similar appeal.

In his letter to Phoenix, Mr. Henderson stated that "if subsequent investigations indicate that the conclusions of this office, based upon our preliminary investigation, are without foundation in fact, this order will be revised."

The OPACS has not as yet taken any action to include pig iron in its price schedule but the assumption is that it will do so.

Two opposing conclusions are being drawn from the Phoenix Iron Co. case. Some steel men feel that the case is not significant in that it reflects a status quo of something which existed prior to the steel price freezing order. However, another group is interpreting Mr. Henderson's latest decision as leaving the door open for a definite dual price system whereby some steel companies, especially the smaller ones, will be allowed to charge more than the so-called published price in order to offset higher operating costs.

One large pig iron seller has established the practice of accepting orders on the basis of prices published in THE IRON AGE at the time of shipment in order to eliminate some of the confusion surrounding pig iron prices.

OPACS has not issued a ruling as yet on steel export prices, but meanwhile some steel exporters are construing the price freezing order as applying to the export prices that were in effect on March 31, these in many instances having been considerably higher than domestic prices.

Sheets and Strip

. . . Some small plants affected by shortage

PITTSBURGH reports isolated cases where small manufacturing plants are forced to curtail operations because of delayed sheet deliveries. Plate tonnage for ship building programs continues to interfere substantially with sheet schedules. Pressure by automobile companies for delivery of material on books is terrific and is causing considerable rumbling.

The volume of sheet orders at CHICAGO is so great that one mill's statement of delivery promises as far ahead as the second and third quarters of 1942 caused little surprise. Despite this situation, the sheet problem is not as perplexing as that existing in plates. Practically every consumer of sheets in that district, defense or otherwise, is trying to get requirements on the books.

Railroad Buying

. . . New program will take several million tons of steel

The projected railroad equipment program to meet the needs of the defense program will require an estimated 2,700,000 tons of steel, exclusive of rails and accessories, wheel, axles and castings in 1942 and 1943. This tonnage is based on a tentative program calling for the construction of 120,000 cars in 1942 and 150,000 cars in 1943. In addition, rail needs through 1942 will amount to 2,500,000 tons.

The 1942 needs of the car program, including material already on order, are put at 500,000 tons of castings, 200,000 tons of forgings, more than 1,000,000 tons of plates and 1,750,000 tons of shapes, wheels, etc.

Steel requirements over the remainder of 1941 are put at 4,914,556 tons in a study conducted by the Association of American Railroads. This tonnage consists of 3,313,420 tons for rails and track fastenings and steel for cars to be built in railroad shops, 1,497,514 tons for independent car builders' activities and 103,622 tons for locomotive construction.

The OPM has indicated that only verbal assurances have been given that the railroad steel requirements will be given "due weight," but these assurances are taken to mean that the steel will be supplied as needed, even though it was stated that OPM is not yet ready to implement verbal assurances with any definite priority action.

At least 12 of the nation's railroads, through allocation or other definite conversations, have indicated the rail tonnage they will require for 1942 programs. Total tonnage already spoken far exceeds 500,000 tons. Formal purchasing orders on this tonnage will come through later in the year and manufacture of the rails will begin in the fourth quarter.

Informal commitments on the tonnage mentioned above are such that railroads can definitely have rails shipped to them after the start of the fourth quarter. Rail mills at present are still rolling 1941 tonnage which is expected to be completed by Sept. 30. As pointed out in THE IRON AGE last week, at least another half a million tons of rails for 1942 programs will be allocated within the next 60 days.

Two freight car building shops are not operating owing to the inability to obtain freight car material, and within a month three other freight car shops may be shut down unless steel is obtained by that time. Backlog at these five car builders' plants amounts to more than 9000 cars. This serious situation has been brought about entirely by the "right of way" given to ship plates for the two recently announced merchant ship building programs.

Unless freight car builders obtain the same treatment as shipbuilders, not only will cars now on order be held up but future car building programs will be seriously endangered. So far, steel companies have not been told by OPM to give freight car material the same treatment as plates and shapes for shipbuilding.

Atlantic Coast Line purchased 800 box cars from Pullman Standard Car Mfg. Co., 800 box and 700 auto box from American Car & Foundry Co., 200 gondolas and 100 phosphate cars from Bethlehem Steel and 300 furniture cars from Mt. Vernon Car Co., making a total of 2900 cars which roughly will consume approximately 35,000 tons of steel.

Rock Island has ordered 1000 50-ton box cars from Pressed Steel Car Co. and Union Pacific 100 cabooses from the Mt. Vernon Car Mfg. Co. Pressed Steel Car Co. is to supply 118 air dump and ore cars to Utah Copper Co., Inland Mine & Stone Co., Republic, Oliver Iron Mining Co. and Tennessee Coal, Iron & Railroad Co. General American Transportation has received an order for 50 box cars from Sanderson & Porter Co. American Car & Foundry is building 25 70-ton hoppers for Pere Marquette, 18 similar units for the Nickel Plate, 15 flat cars for the Navy, two 100-ton flat cars for American Locomotive Co. and six well cars for American Gas &

Electric Co. Despatch Shops is making 14 100-ton transformer cars for the New York Central.

American Locomotive Co. is constructing one diesel-electric switch each for Wabash, Texas Pacific, Missouri Pacific Terminal and South Buffalo, while Electro-Motive Co. supplies three units to the Canton and to the Philadelphia, Bethlehem & New England.

Union Pacific plans to relay 653 miles of track.

Southern is reported to be in the market for 3100 freight cars. Delaware & Hudson is inquiring for 550, Western Pacific for 650, Santa Fe for 100 cabooses and Norfolk & Western for 25 gondolas.

Chicago South Shore & South Bend Railroad has purchased three 100-ton electric locomotives from Iron & Steel Products, Inc.

Merchant Bars

. . . 4,000,000 or more tons of shell steel to be required

Defense requirements are increasing rapidly. One of the problems mills now face is the allocation of orders for shell steel, which will aggregate 4,000,000 to 4,500,000 tons. It is obvious that these large orders cannot be superimposed on already crowded order books without causing a setback in deliveries of bars to consumers not engaged in defense work.

Automobile demand has not tapered off and car makers are applying extreme pressure to obtain prompt shipment of material on order books in order to keep production at top levels as long as possible this year.

Structural Steel

. . . Awards total nearly 50,000 tons, new jobs light

Fabricated structural steel awards of 49,925 tons are the second largest for any week this year. The largest lettings are 26,000 tons for the Consolidated Aircraft plant at Tulsa, Okla.; 3700 tons for the Chase Brass Co. Expansion at Euclid, Ohio; 3200 tons at Chicago for the State Street bridge; 2000 tons at East Alton, Ill., for buildings for the Western Cartridge Co.; 1400 tons at St. Louis for a core building for an ordnance plant; 1300 tons at Providence, R. I., for a building for the New England Telephone & Telegraph Co., and 1000 tons for a machine shop and warehouse for the Louisiana Shipbuilding Corp., New Orleans.

New structural steel projects of 16,750 tons include 3000 tons for Navy aviation buildings at Oakland, Cal.; 2500 tons at Wilmington, Cal., for a steam plant for the Bureau of Power and Light; 1600 tons for two government warehouses at Jeffersonville, Ind; and 1425 tons for the Santa Fe Dam at Azusa, Cal.

Plates

. . . Railroad demand will further jam supply situation

That demand for steel plates will continue far in excess of supply for a long time to come is now acknowledged by consumers as well as producers. In the CLEVELAND territory boiler makers are holding a tremendous backlog of marine and other work while makers of road equipment used in air base construction have four to six months' backlogs. All are finding it difficult to obtain plates readily. One northern Ohio boiler maker has placed an order with one mill for upward of 2000 tons a month.

Tubular Goods

. . . Oil pipe lines may soon be awarded

The assigning of oil tankers for British use is expected to expedite the closing of pipe line deals now under consideration. Early action may be had on the Plantation line to run from Louisiana to the Atlantic seaboard. This line may utilize 6, 8 and 10 in. pipe and the distance covered may run as much as 1500 miles. PITTSBURGH reports standard pipe demand increasing further, line pipe requirements also expanding and oil country goods continuing to show important gains over March total.

Coke

. . . By-product makers advance foundry grade 50c. to 75c.

Several price advances have been announced on by-product foundry coke. New England producers are now quoting $13.75, Newark or Jersey City $12.45 to 12.95, Philadelphia $12.13 and Cleveland $12.05 per net ton. These advances range from 50c. to 75c. a ton.

Shipments of Durham coke from England are becoming an important factor in maintaining blast furnace operations along the Eastern seaboard. Practically every ship returning from England carries some of this coke as ballast. Price of the imported coke is reported to average $8 a ton on the seaboard, or about $1 below the domestic material.

Negotiations are in progress for the rehabilitation of coke ovens at the blast furnace plant of the Delaware River Steel Co., Chester, Pa., which, if the deal goes through, would be operated by the Koppers Co.

Tin Plate

. . . British Empire wants 35,000 tons a month from U. S.

British representatives here have entered a request through official channels for the shipment of 35,000 tons of tin plate a month to be shipped to British dominions and also to Portugal and the Argentine. Owing to the necessity for conserving ships, the British, it is understood, are unable to carry out commitments they have made with the dominions and with the two other countries. Whether the mills here will be able to add 35,000 tons a month to their already heavy commitments has apparently not yet been determined. A large can company has been having great difficulty in filling a relatively small order for shipment to an affiliated company in Switzerland.

Large orders for canned goods for the U. S. Army and for shipment to Great Britain are pending at Washington. These orders, together with normal demand, will place a heavy burden on tin mills.

Leading can and tin plate makers are studying the OPM request for a 10 per cent reduction in tin coatings for cans. Modern tin plate equipment is set up for a maximum speed in order to obtain the current tin thickness. In order to make a 10 per cent reduction in tin coating, some operating changes would be necessary, involving a possible slowing up in the time required for tinning.

Machine Tools

. . . SALES, INQUIRIES AND MARKET NEWS

Large Orders Still Pending

Cleveland

• • • **Large blocks** of new business have been dangled before some of the leading producers recently by defense officials but difficulty in fitting their production into schedules in order to meet the desired delivery dates has worked against their acceptance. Automatics seem to be desired particularly.

Some of the dealers here who have been assisting the OPM in a survey to locate potential shops for machine tool production report only a very limited number of plants which might be in a position to accept such business and do a good job.

Having received a $1,293,000 lease agreement from the government, Jack & Heintz, Inc., manufacturer of airplane starters here, is going ahead with the purchase of equipment and tools. Chevrolet Motor Co. late last week was reported on the verge of receiving a very large award for shells. Willys-Overland apparently is going ahead with its venture into the forging of aluminum, having received large government loans.

Cincinnati Bookings Heavy

Cincinnati

• • • **Heavy machinery** bookings during the last half of April made the month one of the largest in the history of the machine tool business in this area. In fact, one or two manufacturers indicated that April bookings exceeded those of any other month in their history. This, of course, merely serves to emphasize more strongly the heavy backlogs, which by and large now extend into 1942, with shipments averaging all the way from seven months to almost a year and a half. Builders report that they continue to figure on a number of very substantial orders so that the prospect in the immediate future of any substantial diminution of the present heavy ordering, is unlikely.

Production problems continue to receive the chief attention of manufacturers, and building programs are being pressed as rapidly as possible to completion.

Some Machine Tool Plants Operate Sundays

Cleveland

• • • **Machine tool producers** here last Friday promised fullest cooperation with President Roosevelt's plea for higher production. The industry's shipments have been going up steadily and will continue to rise in the next few months.

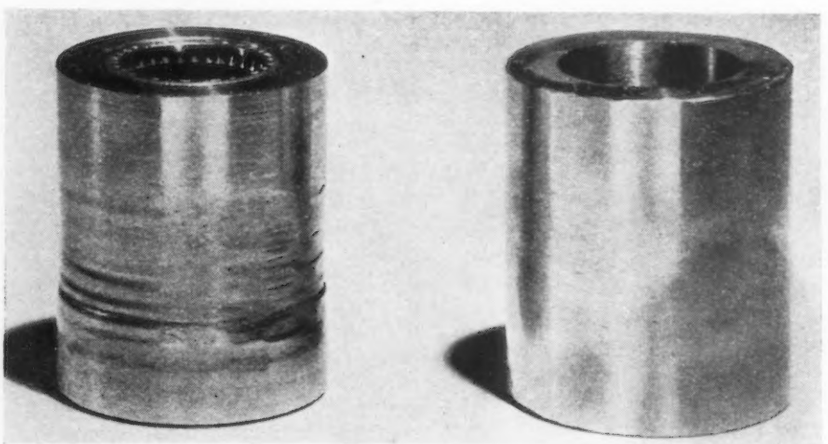
Every resource and skill to expand production has been invoked by the industry since September, 1939, according to Tell Berna, general manager, National Machine Tool Builders Association.

Many machine tool builders already are working some of their departments on Sundays, he continued. Generally the production schedule in the industry is 24 hr. a day, six days a week.

It was the consensus of persons interviewed here Friday that in certain places critical production departments should be on 7-day schedules. Difficulty in finding skilled workers has been a serious obstacle.

Another important factor has been the lack of a sense of emergency on the part of individual machine operators.

Industrialists here are beginning to realize that apparently the government defense program has no maximum limit. Plans for expansion considered ample a few months ago now are obviously too small.



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A hardened tool steel guide roll shown at left is badly worn after only 10 days' operation. At the right you see a guide roll cast from "Coast Metal" which still has a good surface after 90 days' operation.

You can effect economy by using "Coast Metals" Hard-Surfacing castings or weld rods for maintenance of mill equipment to secure much longer life and reduction in replacement shut-downs.

Desirable territories for distribution of Coast Metals are available.

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Non-Ferrous Metals

. . . MARKET ACTIVITIES AND PRICE TRENDS

New York, May 6—Chief feature of the non-ferrous metal markets in the past week was the further extension of government control over the markets. The futures copper market on the Commodity Exchange, at the suggestion of the OPACS, has set a ceiling of 11½c. a lb. over all trades. The net effect of this ruling is to end the normal functions of the copper futures market, placing it in the same category as the zinc futures market, where only liquidation of open interest is permitted. The maxima set on aluminum scrap prices were also revised and extended in an effort to correct several ambiguous situations created by the original order.

Buying of all metals continues at an active pace, but outside of lead, is subject to numerous restrictions in the interest of assuring adequate supplies for the defense program.

Copper demand is especially active, but the allotment program in effect makes it extremely difficult for non-defense users to obtain important tonnages. Shipment of Latin American metal by the RFC is easing the nearby outlook somewhat, but further steps will be needed, it is believed, before a resemblance of a balance in total demand and production can be reached. Copper quotations, meanwhile, hold unchanged with producers quoting 12c. a lb., Valley, custom smelters 12c., and export sellers 11c. to 12c. a lb., f.a.s.

Lead

Despite the freezing of lead prices by defense authorities and the verbal criticism of forward buying, users of lead in the past week continued to place new orders in heavy volume. Total sales in the past week are estimated to have been about double the week's production. While part of the volume was due to the usual first of the month business, the pending inventory control measure was said to have caused some users to attempt to build up inventories before the effective date of the inventory order. Indicated April shipments are in the neighborhood of 74,000 tons, with April needs 40 per cent bought. Prices are unaltered at 5.70c., St. Louis and 5.85c., New York.

Tin

The slow pace at which shipments of tin are being made to the Metals Reserve Co.'s stock piles, as indicated by data released Monday, has served to strengthen the tin market considerably. The report indicated that stock piles were increased to 29,436 tons on April 23, from 20,606 tons on Feb. 23, or a total increase of 8,830 tons in two months. At this rate, outstanding *MRC* contracts will not be completed probably until October, instead of next month as originally expected. The data also indicated that the rate of consumption had increased sharply to about 10,000 tons a month. Tin buying over the past week was again in very good volume with the bulk of the interest centering in August arrivals. Prices held steady at 52c. a lb. most of the week. In view of the latest developments, the possibility of prices declining to the 50c. level to permit resumption of *MRC* purchases is considered very remote.

Zinc

Announcement that the Metals Reserve Corp. had purchased 50,000 tons of zinc ore from Newfoundland was interpreted by the trade as indicating the beginning of a move to build up supplies against the time when domestic refined production may exceed domestic mining capacity. Buying of spelter is still subject to preference ratings, with amount available for other than war use showing a further contraction.

(Non-ferrous prices on page 147.)

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The Plate and Welding Division of the Petroleum Iron Works Company at Sharon, Pennsylvania, has become the Plate and Welding Division of General American Transportation Corporation. New resources combine with the skill and efficiency of this fine old organization to offer you the world's most outstanding pressure vessels, tanks, caissons and other welded steel products.

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Scrap . . . MARKET ACTIVITIES AND QUOTATION TRENDS

The Office of Price Administration and Civilian Supply on Tuesday issued an order amending the original scrap price schedule.

The amended order is broadened to include 34 consuming points instead of the original 13 consuming districts. The number of grades covered by the new order has been increased to 26.

A change was made in the dealers commission from the former 3 per cent to 50c. a ton.

The new order provides for a formula to eliminate the disparity between consumers within the same consuming district and between those outside and those within a consuming district.

There is a new clause to permit the absorption of a certain amount of off-line freight on railroad scrap. Another clause outlines the difference in railroad switching charges.

Still another clause regulates the disparity which arose between barging and all rail shipments where there existed inequalities.

Further details of this amended order were unobtainable at the hour of going to press.

The scrap trade throughout the country is busy clearing up old orders before the end of the week with most centers reporting that material is slow in coming out. The acute shortage in rails has not been relieved and cast grades are waiting for a clarification.

In Eastern Pennsylvania an extremely difficult situation is developing. Here the mills at Coatsville, Conshohoken, Harrisburg, etc., are placed at a disadvantage when they are only allowed to pay as much as Bethlehem. This had been recognized in the past and Bethlehem agreed to pay 50c. below the Eastern Pennsylvania ceiling. A recent shortage of scrap, however, at this mill has led to a price advance and, with Bethlehem paying as much as the ceiling will permit, other consumers are rapidly exhausting their stocks of scrap.

Pittsburgh

Activity is confined to finishing up old orders and it is believed most of the tonnage contracted for prior to April 3 will have been shipped by May 10. Subsequent to that date, clarification as to the new market price setup is expected.

Chicago

Scrap interests in this district are buying and selling only as much as is necessary while they wait for May 10, plus what they hope will also be government clarification of many uncertainties. All old contracts will by no means be cleared up by the 10th, those in short positions generally being unable to improve their situation. Prices on unlisted items are still unsatisfactory.

Philadelphia

Efforts to obtain an adjustment of the price ceilings in eastern Pennsylvania to correct some of the inequalities now prevailing are being intensified. Interest centers on the possibility of establishing an f.o.b price at points where shipments originates. Dealers and brokers are, meanwhile, concentrating on efforts to move old orders before the May 10 deadline, but volume of such shipments, while above the level of last month, are not as high as had been anticipated. A fairly moderate amount of new business has been written on the basis of the new price ceilings.

Cleveland

Winding up as much business as possible this week before the deadline, all interests here were putting on pressure for shipments Monday and Tuesday. Some foundries which have been heavy users of scrap rails continue pinched for their normal supply, particularly in downstate areas which formerly drew material east of Pittsburgh. Some of these foundries hold important defense orders.

Youngstown

Despite tremendous pressure to get scrap into mill yards, the amount of material received here last week was disappointing to buyers. The drive continues this week before the May 10 deadline. Meanwhile consumption remains at the highest point ever achieved here.

Buffalo

Some mill purchases of scrap metal have been made within the past week at the maximum prices allowed by the government. Dealers expect to have all old orders cleaned up by the May 10 deadline. Proposed changes in the cast iron scrap setup are being anxiously awaited here by dealers and brokers. The cast scrap supply continues very tight.

Birmingham

With dealers exerting every effort to get old contracts completed by May 10, there is no change in the general scrap situation here. At present steel mills are obtaining sufficient supplies for their needs but the differential on cast grades has practically eliminated Birmingham from the cast market.

St. Louis

The scrap iron market continues to mark time pending efforts to readjust the government price differentials and the time for completion of contracts on May 10. Dealers continue to buy to cover contracts, but it is reported there has been a slowing up of shipments from the country. Prices are nominally unchanged.

Cincinnati

Except for strong efforts to clear up the orders by May 10, the district old materials market is without feature. Recently announced dealers' buying prices have helped to clarify the market situation, particularly so far as scrap producers are concerned, but as yet, prices have had no definite test. Dealers are accepting quoted lists, but appear to be hoping for some change in Government attitude before complete operations under the ceiling price schedules go into effect. Cast grades are becoming scarce and foundry grades are also in very keen demand.

Detroit

Some of the difficulties in making practical application of government price lists were reflected in dealings on May accumulations of automotive scrap. Varied interpretations by prospective purchasers and by lawyers representing automotive firms, led to the rejection of some bids as too high; actually, it appears that downward revision of the high bids was suggested by the automobile companies in place of outright rejection. The month's accumulations of scrap were split up among various bidders in most cases, instead of the entire accumulation going to one high bidder. The majority of items brought the maximum permissible under the government prices, but a few with known variations (specialties) brought lower prices. Prices quoted in THE IRON AGE remain unchanged again this week.

New York

In a spurt of activity dealers and brokers are trying to meet the deadline at the end of the week to clear up their old commitments. All new business is being entered at the level of $15.75 for No. 1 steel indicating shipment to Bethlehem. Brokers are endeavoring to supply the British requirements of 75,000 tons to be shipped soon.

Toronto

Buying is developing on a broader scale in local markets, with supplies to dealers appearing in larger quantity from automobile wreckers, local producing plants and rural districts. Demand is specially heavy for machinery cast and stove plate, while supply is limited and dealers are unable to fill all orders. Mills and electric furnace interests are taking all offerings of steel scrap materials.

Scrap Prices

Government ceiling prices are given in bold face type;
Market quotations as reported by THE IRON AGE are shown in Italics.

Dollars per Gross Ton delivered to Consumers at: →	Pitts-burgh	Chicago	Eastern Pennsyl-vania	Youngs-town	Cleve-land	Buffalo	Bir-ming-ham	St. Louis	New England	Duluth	Pacific Coast	Dealers' buying prices, Dollars f.o.b. cars: Cincin nati	Detroit	New York*	Toronto	Export N. Y.
STEEL GRADES																
No. 1 heavy melting steel	$20.00	$18.75	$18.75	$20.00	$19.50	$19.25	$17.00	$17.50	$15.50	$18.00	$14.50	*$16.00 to $16.50*	*$16.50 to $17.00*	$15.75	*$12.50*	*$15.75*
No. 2 heavy melting steel	19.00	*16.75 to 17.75*	17.75	19.00	18.50	18.25	16.00	16.50	14.50	17.00	13.50	*15.00 to 15.50*	*15.50 to 16.00*	14.75	*10.50*	*14.75*
New black hyd. comp. sheets, factories	20.00	18.75	18.75	20.00	19.50	19.25	17.00	17.50	15.50	18.00	14.50	*16.00 to 16.50*	*16.50 to 17.00*			
No. 1 bundles (from dealers' yards)	19.00	17.75	17.75	19.00	18.50	18.25	16.00	16.50	14.50	17.00	13.50	*15.00 to 15.50*				
No. 2 dealers' bundles	18.00	16.75	16.75	18.00	17.50	17.25	15.00	15.50	13.50	16.00	12.00	*14.00 to 14.50*				
Mixed borings and turnings	15.50	14.25	14.25	15.50	15.00	14.75	12.50	13.00	9.25	13.50	10.00	*10.00 to 11.00*	*12.00 to 12.50*	11.25	*9.50*	
Machine shop turnings	15.50	14.25	14.25	15.50	15.00	14.75	12.50	13.00	9.40	13.50	10.00	*10.00 to 11.00*	*11.00 to 11.50*	11.25	*9.00*	
Shoveling turnings	16.50	15.25	15.25	16.50	16.00	15.75	13.50	14.00		14.50	11.00	*11.50 to 12.50*	*12.00 to 12.50*			
Heavy steel axle turnings	*19.50*				*18.50*											
Heavy steel forge turnings	*18.50*															
Drop forge flashings					*18.50*	*18.25*							*16.00 to 16.50*		*10.50*	
No. 1 busheling	19.50	18.25	18.25	19.50	19.00	18.75	16.50	17.00	15.00	17.50	14.00	*15.50 to 16.00*	*16.00 to 16.50*		*7.50*	
No. 2 busheling	15.50	14.25	14.25	15.50	15.00	14.75	12.50	13.00	11.00	13.50	10.00	*10.00 to 10.50*	*9.50 to 10.00*			
Uncut structural and plate scrap	19.00	17.75	17.75	19.00	18.50	18.25	16.00	16.50	14.50	17.00	13.50	*15.00 to 15.50*		14.75		
L. phos. billet, bar crops, p'nchgs	25.00	23.75	23.75	25.00	24.50	24.25	22.00	22.50	20.50	23.00	19.50	*20.00 to 20.50*				
Low phos. heavy plate	*24.50 to 25.00*					*24.25*							*19.00 to 19.50*			
RAILROAD GRADES																
No. 1 RR heavy melting steel	$21.00	$19.75	$19.75	$21.00	$20.50	$20.25	$18.00	$18.50	$16.50	$19.00	$15.50	*$18.00 to $18.50*	*$18.85*	16.75		
Scrap rails	22.00	20.75	20.75	22.00	21.50	21.25	19.00	19.50	17.50	20.00	16.50	*20.00 to 20.50*	*19.85*	17.75		
Scrap rails 3 ft. and under	24.00	22.75	22.75	24.00	23.50	22.75	21.00	21.50	19.50	22.00	18.50	*22.00 to 22.50*	*21.85*	19.75		
Scrap rails 2 ft. and under	24.50	23.25	23.25	24.50	24.00	23.75	21.50	22.00	20.00	22.50	19.00	*22.50 to 23.00*	*22.35*	20.25		
Scrap rails 18 in. and under	25.00	23.75	23.75	25.00	24.50	24.25	22.00	22.50	20.50	23.00	19.50	*23.00 to 23.50*	*22.85*	20.75		
Rerolling rails	23.50	22.25	22.25	23.50	23.00	22.75	20.50	21.00	19.00	21.50	18.00	*21.50 to 22.00*	*21.35*	19.25		
RR couplers and knuckles	*24.50 to 25.00*					*24.25*										
Coil and leaf springs	*25.00 to 25.50*							*22.00 to 22.50*								
Steel wheels	*25.00 to 25.50*															
RR malleable	*24.50 to 25.00*				*23.50*	*24.25*		*20.50 to 21.50*								
Steel axles								*25.50 to 26.00*								
Locomotive tires								*20.00 to 20.50*								
FOUNDRY GRADES																
No. 1 cupola	*$22.55 to $23.94*	$22.60	*$23.50 to $24.50*	*$22.50 to $23.39*	$22.50	*$22.00 to $22.50*	$18.38	$22.50				*$20.00 to $21.00*	*$21.50 to $22.00*	*$21.00*	*$20.00*	
Heavy breakable cast	*21.05 to 22.41*	21.10	*22.34 to 23.03*	*21.00 to 21.89*	21.00	*20.00 to 20.50*		21.00	$18.25			*18.00 to 19.50*	*17.50 to 18.00*	*19.00*	*18.00*	
Stove plate	*17.55 to 18.94*	17.60	*18.84 to 19.53*	*17.50 to 18.39*	17.50	17.00	13.00	17.50	14.50			*14.00 to 15.00*	*15.00 to 15.50*	*17.50*	*16.00*	*$17.50*
Cast iron car wheels	*22.55 to 23.94*											*17.00 to 18.50*				
Grate bars			*18.84 to 19.53*		*17.50*			*$14.50 to $15.00*				*14.00 to 15.00*				
Cast iron borings	15.50	14.25	14.25	15.50	15.00	14.75	12.50	13.00	11.00	$13.50	$10.00	*10.00 to 11.00*	*12.00 to 12.50*	10.75	*9.00*	
Cast iron borings (chem.)																
Unprepared yard scrap														*10.00*		

*Brokers' prices for delivery to Eastern Pennsylvania consumers

All consumers' prices subject to 3 per cent broker's commission.

Cincinnati: Loose sheet clippings, *$12.00 to $12.50.* Detroit: Long turnings, *$10.00 to $10.50;* Automotive cast, *$21.50 to $22.00;* Sheet clippings, *$13.00 to $13.50.*

Construction Steel

. . .STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Lettings in good volume at 49,925 tons; new projects advance to 16,750 tons from 11,110 tons last week.

AWARDS

NORTH ATLANTIC STATES

1300 Tons, Providence, R. I., building for New England Telephone & Telegraph Co., to Bethlehem Steel Co., Bethlehem, Pa.

950 Tons, Philadelphia, service building for Navy Yard, to Bethlehem Steel Co., Bethlehem, Pa., through Dry Dock Associates, Inc.

650 Tons, New York, public school No. 21 in Bronx, to Harris Structural Steel Co., Plainfield, N. J.; John T. Brady & Co., contractors.

520 Tons, Buffalo, addition for Millard Fillmore Hospital, to Bethlehem Steel Co., Buffalo.

400 Tons, Trenton, N. J., telephone building, to Lehigh Structural Steel Co., Allentown, Pa.

350 Tons, New Bedford, Mass., power house extension for Massachusetts Gas & Electric Co., to Belmont Iron Works, Philadelphia.

270 Tons, Middletown, Pa., three airport warehouses, to American Bridge Co., Pittsburgh.

250 Tons, Effingham-Freedom, N. H., State bridge, to American Bridge Co., Pittsburgh.

250 Tons, Pine Camp, N. Y., eight ordnance repair buildings, to Butler Co., Kansas City, through John W. Cowper Co., Inc., Buffalo.

220 Tons, Oswego, N. Y., factory addition for Fitzgibbons Boiler Co., to American Bridge Co., Pittsburgh.

200 Tons, Buffalo, plant addition for Bliss & Laughlin, Inc., to Lackawanna Steel Construction Corp., Buffalo.

175 Tons, Brooklyn, pedestrian bridges, etc., for Navy, to American Bridge Co., Pittsburgh.

160 Tons, Syracuse, N. Y., power house addition, to Leech Steel Co., Rochester, N. Y., through United Engineering Co., Pittsburgh.

150 Tons, Cambridge, Mass., Holy Ghost Hospital for Incurables unit, to Massachusetts bidder, through Charles Lugue Building Co., Boston, contractor.

125 Tons, Monroe County, Pa., highway bridge, route 169, section 9, to Bethlehem Steel Co., Bethlehem, Pa.

120 Tons, Hartford, Conn., Commerce Street bridge, to American Bridge Co., Pittsburgh.

100 Tons, Jersey City, N. J., ash pit structure for Central Railroad of New Jersey, to Bethlehem Steel Co., Bethlehem, Pa.

THE SOUTH

26,000 Tons, Tulsa, Okla., Consolidated Aircraft Corp. plant, to American Bridge Co., Pittsburgh.

1600 Tons, New Orleans, machine shop and warehouse for Louisiana Shipbuilding Corp., to Bethlehem Steel Co., Bethlehem, Pa.
tion for A. & R., to Mosher Steel Co.,

900 Tons, Corpus Christi, Texas, shop addi- Dallas, Tex.

CENTRAL STATES

3700 Tons, Euclid, Ohio, expansion for Chase Brass Co., to American Bridge Co., Pittsburgh.

3200 Tons, Chicago, State Street bridge, to American Bridge Co., Pittsburgh.

2000 Tons, East Alton, Ill., buildings for Western Cartridge Co.; 1400 tons to Joseph T. Ryerson & Son, Inc., Chicago; 600 tons to Superior Steel Co., St. Louis.

1400 Tons, St. Louis, core building for ordnance plant, to Mississippi Valley Structural Steel Co., St. Louis.

700 Tons, Bay City, Mich., unit No. 3 Weddock plant, for Commonwealth & Southern Corp., to Milwaukee Bridge Co., Milwaukee.

460 Tons, Detroit, machine shop extension for Chrysler Corp., to Whitehead & Kales Co., Detroit.

440 Tons, Detroit, press shop for Chrysler Corp., to Whitehead & Kales Co., Detroit.

350 Tons, Dayton, Ohio, addition to power house for Dayton Power & Light Co., to Burger Iron Co., Akron, Ohio.

330 Tons, Bedford, Ohio, Jack & Heintz expansion, to Bethlehem Steel Co., Bethlehem, Pa.

275 Tons, Cleveland, Park Drop Forge Co. expansion, to American Bridge Co., Pittsburgh.

250 Tons, Minneapolis, Minn., hangar and shop building, Wold Chamberlain Field, to Minneapolis-Moline Power Implement Co., Minneapolis, Minn.

250 Tons, Vassar, Mich., State highway bridge, to Wisconsin Bridge & Iron Co., Milwaukee.

200 Tons, Elwood, Ill., 10 railroad bridges for Government, to Wisconsin Bridge & Iron Co., Milwaukee.

200 Tons, Fort Crook, Neb., bridge for Omaha bomb assembly plant, to Omaha Steel Works, Omaha, Neb.

200 Tons, Cleveland, Cleveland Clinic extension, to American Bridge Co., Pittsburgh.

165 Tons, South Holland, Ill., State bridge, route No. 3, section No. 359-SF, to American Bridge Co., Pittsburgh.

140 Tons, Zanesville, Ohio, State bridge, to Burger Iron Co., Akron, Ohio.

WESTERN STATES

925 Tons, San Pedro, Cal., bearing piles for fleet operating base, to Columbia Steel Co., San Francisco, through Atkinson & Pollack, contractors.

275 Tons, various locations, bridges Nos. 76.32, 47.59, 44.70, 92.39, 170.95, for Union Pacific Railroad Co., to American Bridge Co., Pittsburgh.

215 Tons, North Powder and Lonard, Ore., bridges Nos. 188.63, 324.06, 365.14, for Union Pacific Railroad Co., to American Bridge Co., Pittsburgh.

140 Tons, Hawthorne, Nev., torpedo storage buildings for government, to American Bridge Co., Pittsburgh.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

850 Tons, Rochester, N. Y., addition, steam plant for Rochester Gas & Electric Co.

650 Tons, Philadelphia, service building for Navy.

450 Tons, Philadelphia, building for Philadelphia Savings Fund Society.

400 Tons, Providence, R. I., weaving building for J. Collins & Aikman; Turner Construction Co., Boston, contractor.

300 Tons, Marion, N. J., turbine extension room, Public Service Co. of New Jersey.

275 Tons, Portsmouth, N. H., arch bridge for Navy.

255 Tons, Pittsburgh, office and garage for Braun Baking Co.

225 Tons, Mercer County, Pa., State overpass.

200 Tons, Brooklyn, blacksmith shop for Todd Shipbuilding Corp.; Irons & Reynolds, Inc., New York, contractor.

165 Tons, Philadelphia, engine room extensions, central power plant, for Navy.

150 Tons, Columbia City, Pa., highway bridge, route Pa. 19067.

135 Tons, Monroe County, Pa., rebidding for highway bridge, route 6, section 21A.

100 Tons, Cambridge, Mass., Radcliffe College music building.

100 Tons, New York, public school No. 120.

100 Tons, Meriden, Conn., building for Chandler-Evans Co.; Brown & Matthews, Inc., New York, contractor.

THE SOUTH

600 Tons, Richmond, Va., addition to rayon plant for E. I. du Pont de Nemours & Co.

200 Tons, Richmond, Va., country club for E. I. du Pont de Nemours & Co.

190 Tons, Covington, Ky., store building for F. W. Woolworth Co.

175 Tons, Watts Bar Dam, Tenn., floating caisson, hydro plant, for TVA.

110 Tons, Halifax, Va., State beam bridges.

CENTRAL STATES

1600 Tons, Jeffersonville, Ind., two government warehouses.

450 Tons, Lake Forest, Ill., State bridge, route No. 59-A.

350 Tons, Duluth, Minn., State underpass, bridge No. 5777.

325 Tons, Bedford, Ohio, factory building for Defense Plant Corp.

300 Tons, Cleveland, machine shop for Park Drop Forge Co.

180 Tons, various locations, bridge repairs for Milwaukee Road.

160 Tons, Cleveland, building for Massachusetts Mutual Life Insurance Co.; bids in.

140 Tons, Cincinnati, plant additions for Eastern Machinery Co.

105 Tons, Cleveland, Cedar-Garfield telephone exchange; bids in.

Weekly Bookings of Construction Steel

Week Ended ——→	May 6, 1941	Apr. 29, 1941	Apr. 8, 1941	May 7, 1940	Year to Date 1941	Year to Date 1940
Fabricated structural steel awards	49,925	42,550	27,400	11,400	602,710	250,810
Fabricated plate awards	0	15,100	780	310	66,380	51,265
Steel sheet piling awards	665	0	0	0	15,715	15,765
Reinforcing bar awards	8,410	29,535	16,100	4,220	247,255	142,250
Total Letting of Construction Steel	59,100	87,185	44,280	15,930	931,520	460,090

WESTERN STATES

3000 Tons, Oakland, Cal., eight Navy aviation buildings.
2500 Tons, Wilmington, Cal., Bureau of Power and Light steam plant; bids soon.
1425 Tons, Azusa, Cal., Santa Fe Dam, miscellaneous work; bids about June 9.
125 Tons, Placerville, Colo., State bridge FAP-103-E (1).
120 Tons, Denver, State overpass, FAGM-48-A (1).
115 Tons, Garland, Utah, State bridge.
108 Tons, Provo, Utah, State highway bridge; bids May 12.
103 Tons, Norwood, Colo., San Miguel River bridge; bids May 9.

FABRICATED PLATES

PENDING PROJECTS

3000 Tons, Sunnyvale, Cal., Moffett Field wind tunnel; bids May 20.
175 Tons, Arlington, Mass., Metropolitan Water District water tank.

SHEET PILING

AWARDS

415 Tons, Chicago, Commonwealth Edison Co., to Bethlehem Steel Co., Bethlehem, Pa.
250 Tons, San Francisco, sea wall, to Columbia Steel Co., San Francisco, through C. W. Caletti Co., San Rafael, contractor.

PENDING PROJECTS

250 Tons, San Diego, Navy fuel depot; Fred W. Steffgren, San Diego, contractor.

Reinforcing Steel

Awards of 8,410 tons; 12,915 tons in new projects.

AWARDS

ATLANTIC STATES

800 Tons, Bridgeport, Conn., defense housing project, to Truscon Steel Co., New York; Wilcox Construction Co., New York, contractor.
300 Tons, Cambridge, Mass., Massachusetts Institute of Technology chemical laboratory, to Concrete Steel Co., Boston.

SOUTH AND CENTRAL

2000 Tons, Omaha, Neb., Fort Crook project, to Ceco Steel Products Co., Los Angeles.
1400 Tons, Chicago, superstructure, Studebaker airplane engine plant, to Bethlehem Steel Co., Bethlehem, Pa.; S. N. Nielson Co., contractor.
1000 Tons, Sandusky, Ohio, Plum Brook ordnance plant, to Truscon Steel Co., Youngstown, through E. B. Badger & Sons Co., Boston.
190 Tons, Columbus, Ind., highway bridges Nos. 2140 and 2141, to Bethlehem Steel Co., Bethlehem, Pa.; R. L. Schutt, contractor.
180 Tons, Hamilton County, Ohio, highway project No. 21, to Pollak Steel Co., Cincinnati; J. & F. Harig Co., contractor.

WESTERN STATES

950 Tons, San Diego, Cal., Navy drydock, to Western Metals Co., San Diego, through Pacific Bridge Co., San Francisco, contractor.
700 Tons, San Pedro, Cal., Navy fleet operating base, to Soule Steel Co., Los Angeles, through Atkinson & Pollack, contractor.
600 Tons, Los Angeles, Thousand Gardens housing project, to Blue Diamond Co p., Los Angeles, through H. M. Baruch, Los Angeles, contractor.

HAWAII

290 Tons, Schofield Barracks, administration barracks, to Bethlehem Steel Co., Los Angeles, through Robert E. McKee, Los Angeles, contractor.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

1400 Tons, Providence, R. I., housing project.
700 Tons, South Kearney, N. J., Federal Shipways & Dry Dock Co., shipways; W. Kidde, contractor.
450 Tons, Rutherford, N. J., State highway bridge; Felhaber Pile Co., New York, low bidder on contract.
350 Tons, Queens, N. Y., sewer; Charles Bennett Improvement Co., Inc., Brooklyn, low bidder on contract.
340 Tons, Baltimore, addition, Lever Bros. soap plant; Stone & Webster Engineering Corp., contractor.
175 Tons, Elmira, N. Y., U. S. Engineers' flood control, section No. 1; Binghamton Construction Co., Binghamton, N. Y., general contractor.
120 Tons, Rutland, Vt., municipal opening, bids taken.
100 Tons, East Boston, structural shop for Navy.

SOUTH AND CENTRAL

1700 Tons, Durant, Okla., substructure Washita River and Rock Creek bridges; bids May 16 at U. S. Engineer's Office, Denison, Tex.
600 Tons, Dubuque, Iowa, substructure, Mississippi River bridge; bids May 14.
500 Tons, St. Paul; Minnesota Mining Co., tape plant.
350 Tons, Blue Mountain, Ark., Government dam; Myers & Goen, Salem, Inc., low bidders on general contract.
200 Tons, St. Paul, sausage making building for Swift & Co.
150 Tons, Chicago, Coca Cola garage and storage building.
130 Tons, Chicago, yard repairs, Atchison, Topeka & Santa Fe Railroad.

WESTERN STATES

5750 Tons, Azusa, Cal., Santa Fe Dam; bids about June 9.
350 Tons, Fresno, Cal., County jail; bids in.

Pipe Lines

Kansas-Nebraska Natural Gas Co., Phillipsburg, Kan., recently organized to take over and consolidate pipe lines and properties of Kansas Pipe Line & Gas Co. and Nebraska Natural Gas Co., plans new 8-in. welded steel pipe line from gas field at Hugoton, Kan., to Cambridge, Neb., more than 225 miles, for natural gas transmission. Cost close to $1,000,000 with booster stations and other operating facilities. This is part of 1941 expansion program of company, which is completing financing totaling over $3,000,000, of which approximately $1,700,000 will be used for purchase of property of Nebraska company, and part of remainder for new pipe lines and facilities, mentioned.

Hastings, Neb., has approved bond issue of $250,000 for pressure pipe line system for municipal gas distribution, with operating facilities.

Mid-West Gas & Fuel Co., Lancaster, Ohio, plans new 12-in. welded steel pipe line from connection with present pipe line system at Rock Ridge, Hocking County, to Pomeroy, Ohio, over 50 miles, crossing Ohio River at latter place to West Virginia, for natural gas transmission from West Virginia fields.

United States Engineer Office, Tulsa, Okla., has low bid from Flotation Systems, Inc., 4031 Goodwin Avenue, Los Angeles, at $119,880 for pressure pipe line system at air corps field, Oklahoma City, Okla., for gasoline fueling and distribution.

Southern Gas Co., Longview, Tex., Roger Lacy, president, has approved plans for new welded steel pipe line from Longview to Kilgore, Tex., about eight miles, consisting of two 4-in. paralleling lines, for natural gas transmission.

United States Engineer Office, 751 South Figueroa Street, Los Angeles, will take bids soon for pressure pipe line system for gasoline fueling and distribution at air corps field, municipal airport, Tucson, Ariz. Recent call for bids (Circular 143) on April 16 has been postponed.

Bureau of Reclamation, Denver, has taken bids under Invitation C-46,051-A on 30,000 ft. of 18-in. outside diameter, 12 gage steel pipe for Colorado-Big Thompson project, delivery at Granby, Colo.; also, under Invitation C-46,052-A, on 6600 ft. of 20-in. outside diameter 14-in. steel ventilating pipe (Schedule 1), 8400 ft. of similar pipe (Schedule 2), and/or 15,000 ft. of similar pipe (Schedule 3).

Bureau of Reclamation, Denver, has awarded 3,000,000 ft. of 1-in. outside diameter black steel pipe and 11,000 180-degree bends to Laclede Steel Co. for delivery at Coram, Cal., under Invitation A-33,182-A; also for same delivery point 910,000 ft. of ½-in. thin-wall steel tubing, 270,000 ft. of 1-in. thin-wall steel tubing, and 370,000 ft. of 1½-in. thin-wall steel tubing to Westinghouse Electric & Mfg. Co., San Francisco, under Invitation A-33,184-A; also 261,000 galvanized fittings to Appleton Electric Co., Chicago, under Invitation A-33,185-A; and 290,000 couplings to Appleton Electric Co., Chicago, under Invitation A-33,183-A.

Sandusky, Ohio, plans pipe line extensions in water system in several streets, including new main line from present system near Cleveland Road to Plum Brook ordnance plant of Federal government, for service at that point.

Sacramento, Cal., has awarded 239 tons of 4, 6, and 8-in. pipe to United States Pipe & Foundry Co., San Francisco.

East Bay Municipal Utility District, Oakland, Cal., has awarded 1187 tons of 6 and 8-in. pipe to United States Pipe & Foundry Co., San Francisco, and 358 tons of 4-in. pipe to American Cast Iron Pipe Co., San Francisco.

Tuscon, Ariz., municipal airport lines, requiring 340 tons of 3 to 12-in. pipe, has been awarded to United States Pipe & Foundry Co. through Charles J. Dorfman, Los Angeles, contractor.

San Diego, Cal., has awarded 560 tons of 16-in. class 250 pipe to United States Pipe & Foundry Co., San Francisco, for LaJolla Shores and Harbor Drive pipe lines; Mission Valley pipe line will be constructed of reinforced concrete steel cylinder pipe by American Concrete & Steel Pipe Co., South Gate, Cal.

Glendale, Cal., has opened bids on 6000 ft. of 6-in., 1000 ft. of 12-in., 2000 ft. of 16-in., and 1500 ft. of 24-in. class 250 cement lined cast iron pipe, valves, hydrants, and fittings.

Cast Iron Pipe

Bristol County Water Co., Bristol, R. I., is in the market for a tonnage of 6-in. pipe.

Hindsdale, N. H., will receive bids until May 20 for a round tonnage of 6 to 10-in. pipe.

Fitchburg, Mass., has requested a loan order of $250,000 for pumping plant improvements and water system extension. Thomas E. Kennedy is superintendent of water department.

Procurement Office, Treasury Department, Boston, has taken under advisement bids on 2650 ft. of 8-in. pipe for Haverhill, Mass., 1369 ft. of 8-in. for Worcester, Mass., and 464 ft. of 10-in. for Hopkington, Mass.

Lorimor, Iowa, plans pipe lines for water system and other waterworks installation. Cost about $30,000. Special election has been called May 14 to vote bond issue in that amount.

Perry, Ohio, plans pipe lines for water system and other waterworks equipment. Cost about $68,000. Financing is being arranged through Federal aid. Carl J. Simon & Associates, Van Wert, Ohio, are consulting engineers.

Sewerage and Water Board, New Orleans, A. Baldwin Wood, general superintendent, plans extensions in main pipe lines to Federal properties on lake front, where national defense projects are under way, for water supply. Cost about $220,685; fund in that amount has been approved by Government for work.

La Crosse, Wis., will take bids soon for about 2412 ft. of 6-in. pipe for extensions in water system in McDonald Heights district; also for similar-sized pipe for extensions in water system in parts of Travis Street and Hyde Avenue. J. H. Barth is city engineer.

Glendale, Ariz., plans pipe line extensions in water system. Fund of $68,000 has been authorized, including new pumping equipment and water storage tank. This is part of $78,000 bond issue voted recently, remainder of appropriation to be used for extensions and improvements in sewage system.

Water Department, Tulsa, Okla., W. F. McMurry, water superintendent, plans new 36-in. pressure pipe line for main water supply from municipal pumping station to connection with city distribution system. Cost about $400,000; also extensions and improvements in pipe lines in different parts of city to cost about $489,000. This is part of general expansion and improvement program for municipal waterworks, to cost about $1,300,000. Other work will include new pumping equipment at Mohawk station, extensions in filtration plant, chlorine building and machinery, and new coagulation basin.

Niagara Falls, N. Y., plans about 7280 ft., various sizes, for extensions and replacements in water system in different parts of city. H. W. Clark is city engineer.

Prices of Finished Iron and Steel...

Steel prices on these pages are f.o.b. basing points (in cents per lb.) unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	
Long ternes[2]	3.80¢		3.80¢									4.55¢			
Wrought iron	4.75¢														
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢		
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢								
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢		
TIN PLATE Standard cokes (Per 100-lb. base box)	$5.00	$5.00	$5.00						$5.10						
BLACK PLATE 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ (10)			
TERNES, M'FG. Special coated (Per base box)	$4.30		$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢		
Reinforcing (rail)[7]	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢				2.40¢	2.45¢	2.15¢		
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			Detroit = 2.70¢)						
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Coatesville and Claymont = 2.10¢)		2.45¢	2.65¢		2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	*
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)										
SHAPES Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem = 2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Spring	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)								
PILING Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			
IRON BARS Common		2.25¢			(Terre Haute, Ind. = 2.15¢)										
Refined	3.75¢														
Wrought	4.40¢														

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to 29 gage within certain width and length limitations. [6] For merchant trade. [7] Straight lengths as quoted by distributers. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lots to manufacturing trade. [10] Boxed.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher f.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Shell Steel

Basic open hearth shell steel f.o.b. Pittsburgh and Chicago.

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity. This type of steel is for hot rolled sections used for the forging of shells and includes rounds, round squares, and special sections.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)	*Per Lb.*
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., $3 a net ton higher. Quantity extras apply.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh; Package, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

WIRE PRODUCTS

(To the Trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	$3.05
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. and smaller by 6 in. and shorter	68
9/16 and ⅝ in. by 6 in. and shorter	66
¾ to 1 in. by 6 in. and shorter	64
1⅛ in. and larger, all lengths	62
All diameters over 6 in. long	62
Lag, all sizes	65
Plow bolts	68½
Hot pressed nuts; c.p.c., t-nuts; square, hex., blank or tapped:	
½ in. and smaller	66
9/16 to 1 in. inclusive	63
1⅛ to 1½ in. inclusive	61
1⅝ in. and larger	60

On above items, excepting plow bolts, additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
7/16 in. and smaller		68
½ in. and smaller	66	
½ in. through 1 in.		64
9/16 to 1 in.	63	
1⅛ in. through 1½ in.	61	62
1⅝ in. and larger	60	60

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose	71 and 10
Stove bolts in packages, with nuts attached	71
Stove bolts in bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York, lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.40

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 10

Cap and Set Screws *Per Cent Off List*

Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	68
Upset set screws, cup and oval points	74
Milled studs	52
Flat head cap screws, listed sizes	43
Filister head cap screws, listed sizes	56

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Apr. 30	May 1	May 2	May 3	May 5	May 6
Copper, Electrolytic[1]	12.00	12.00	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00	12.00	12.00
Tin, Straits, New York[2]	52.00	52.00	52.125	....	52.00	52.00
Zinc, East St. Louis	7.25	7.25	7.25	7.25	7.25	7.25
Lead, St. Louis[3]	5.70	5.70	5.70	5.70	5.70	5.70

[1] Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Products

Cents per lb., Delivered

	New York	Cleveland
Tin		
Straits pig	52.75	55.00
Copper		
Electro	13.00	13.50
Castings	12.50	13.00
H. R. Sheets*	20.12	20.12
Seamless tubes*	20.62	20.62
Brass		
Yellow sheets*	18.65	18.65
Yellow, rods*	13.67	13.67
Seamless tubes*	21.40	21.40
Zinc		
Slabs	Nom'al	Nom'al
Sheet, No. 9 casks	Nom'al	Nom'al
Lead		
American pig	6.85	6.35
Bar	8.70	8.85
Cut sheets	9.00	9.10
Antimony		
Asiatic	16.00	17.00
Aluminum		
Virgin, 99%	20.00	21.00
No. 1 remelt., 98-99%	18.00	18.50
Solder		
½ and ½	32.00	32.75
Babbitt		
Anti-friction grade	23.50	21.75

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper		
Hvy crucible	10.375	11.00
Hvy. and wire	9,375	9.775
Light and bottoms	8.375	8.875
Brass		
Heavy	6.125	6.625
Light	5.125	5.875
No. 1 yel. turn	5.875	6.375
No. 1 red or compo. turnings	9.125	10.125
Hvy. Mach. compo.	9.50	9.725
Lead		
Heavy	5.00	5.50
Aluminum		
Cast	11.00-12.00	
Sheet	12.00-13.50	
Zinc	5.10	

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 17c.-18c. a lb.; No. 12 remelt No. 2, standard, 16c. a lb. NICKEL electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, $180-$182, per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 13.25c. a lb.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras; on copper sheets, 33⅓; on brass sheets and rods, 40; on brass tubes, 33⅓, and copper tubes, 40.

ALLOY STEEL

Alloy Steel Blooms, Billets and Slabs

Base per gross ton, f.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem $54.00

Alloy Steel Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade ..... 2.70c.
Delivered, Detroit ..... 2.80c.

S.A.E. Series Numbers	Alloy Differential, per 100 Lb.
2000 (1.5 Ni)	$0.35
2100 (1.5 Ni)	0.75
2300 (3.5 Ni)	1.70
2500 (5 Ni)	2.55
3100 Ni-Cr	0.70
3200 Ni-Cr	1.35
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
x4340 Cr-Ni-Mo	1.70
4340 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.2-0.3 Mo, 1.5-2 Ni)	1.20
5100 (0.60-0.90 Cr)	0.35
5100 (0.80-1.10 Cr)	0.45
5100 Cr spring steel	0.15
52-100 Cr. (electric furnace)	2.60
6100 Cr-V bar	1.20
6100 Cr-V spring steel	0.85
C-V	0.85

The above differentials are for hot rolled finished products. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. Delivered Detroit, 3.45c. carlots.

Alloy Steel Plates

Base per lb., f.o.b. Pittsburgh, Chicago and Coatesville.

Open hearth grade ..... 3.50c.

Testing Hardness with Brinell Machine

TESTS That may help YOU lick "METAL FAILURE"

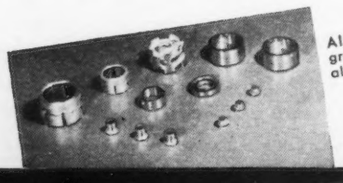
Testing to Determine Yield Strength

How Accurate Physical Testing *Safeguards* AMPCO QUALITY

Tests such as those illustrated above assure the uniform hardness and great strength of AMPCO METAL and the outstanding ability of this aluminum bronze alloy to resist wear, impact, fatigue and corrosion.

But the real proof lies in the "success stories" reported by industry itself — accounts of how AMPCO METAL has repeatedly made good when all other metals have failed. Among AMPCO'S 2,000 customers are manufacturers of aircraft and aviation equipment, machine tools and heavy machinery — in fact, the front line of National Defense. AMPCO engineers are experienced in solving difficult metal problems, and your inquiry will be welcomed.

AMPCO METAL, INC., Dept. IR-58, Milwaukee, Wisconsin



AIRCRAFT PARTS — a representative group of AMPCO-MADE aircraft parts, all precision machined by AMPCO.

MACHINE TOOLS—leading manufacturers standardize on AMPCO METAL because of its stubborn resistance to wear, "squashing out" and shock loads.

AMPCO METAL

The Metal Without An Equal

AMPCO

STAINLESS AND HEAT-RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chromium-Nickel

No.	304	302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium

No.	410	430	442	446
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
H'tstrip	17.00c.	17.50c.	24.00c.	35.00c.
C'ld st.	22.00c.	22.50c.	32.00c.	52.00c.

20% Chromium-Nickel Clad Steel

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

ELECTRICAL SHEETS

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago..$54.80
6-in. and larger, del'd New York 52.20
6-in. and larger, Birmingham.. 46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle 56.00

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
1 in. o.d.13 B.W.G.	$9.01	$7.82	....
1¼ in. o.d.13 B.W.G.	10.67	9.26	....
1½ in. o.d.13 B.W.G.	11.70	10.23	$9.72
1¾ in. o.d.13 B.W.G.	13.42	11.64	11.06
2 in. o.d.13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d.13 B.W.G.	16.76	14.54	13.79
2¼ in. o.d.12 B.W.G.	18.45	16.01	15.16
2½ in. o.d.12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d.12 B.W.G.	21.42	18.59	17.54
3 in. o.d.12 B.W.G.	22.48	19.50	18.35
3½ in. o.d.11 B.W.G.	28.37	24.62	23.15
4 in. o.d.10 B.W.G.	35.20	30.54	28.66
4½ in. o.d.10 B.W.G.	43.04	37.35	35.22
5 in. o.d. 9 B.W.G.	54.01	46.87	44.25
6 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. over .....Base
30,000 lb. or ft. to 39,999 lb. or ft. 5%
20,000 lb. or ft. to 29,999 lb. or ft. 10%
10,000 lb. or ft. to 19,999 lb. or ft. 20%
5,000 lb. or ft. to 9,999 lb. or ft. 30%
2,000 lb .or ft. to 4,999 lb. or ft. 45%
Under 2,000 lb. or ft. 65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought iron pipe)

Base Price = $200 Per Net Ton

Butt Weld

Steel	Black	Galv.
⅛ in.	56	33
¼ to ⅜ in.	59	40½
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron	Black	Galv.
¼ and ⅜ in.	+9	+33
½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18

Lap Weld

Steel		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
7 and 8 in.	65	52½
9 and 10 in.	64½	52
11 and 12 in.	63½	51
Wrought Iron		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
9 to 12 in.	28½	12

Butt weld, extra strong, plain ends

Steel	Black	Galv.
⅛ in.	54½	38½
¼ to ⅜ in.	56½	42½
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron		
¼ and ⅜ in.	+10	+46
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½

Lap weld, extra strong, plain ends

Steel		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
7 and 8 in.	65½	53
9 and 10 in.	64½	52
11 and 12 in.	63½	51
Wrought Iron		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21
7 and 8 in.	38½	21½
9 to 12 in.	32	17½

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

ROTOBLAST CLEANING

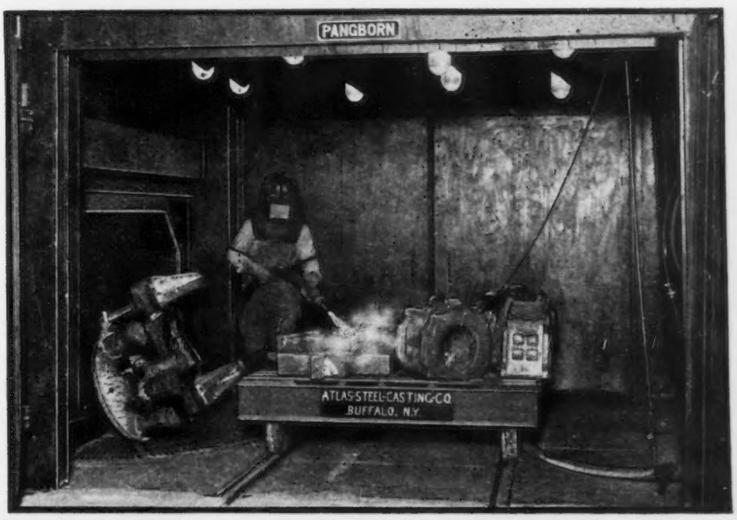
Increased Production at Lower Cost

• The Pangborn Airless Rocker Barrel—in sizes from 3½ to 28 cubic feet load capacity—with or without automatic loading device—will give new production life to your blast cleaning department. ★ So will ROTOBLAST Tables. ★ So will automatic Special Machines. ★ If SPEED is a factor—WIRE for data TODAY.

AIR BLAST CLEANING

Essential for Mass Production of Miscellaneous Work

• In spite of the popularity of Airless ROTOBLASTING units, the demand for Air Blast equipment is greater today than ever before. ★ Air Blast ROOMS for large miscellaneous work. ★ CABINET for occasional work. ★ Automatic CABINET Machines for shells, bombs, etc. ★ ALL make Pangborn Air Blast installations VITAL PRODUCTION UNITS in countless industrial plants today.



PANGBORN

WORLD'S LARGEST MANUFACTURER OF BLAST CLEANING AND DUST COLLECTING EQUIPMENT

PANGBORN CORPORATION . . . HAGERSTOWN, MARYLAND

ORES

Lake Superior Ores

Delivered Lower Lake Ports

	Per Gross Ton
Old range, bessemer, 51.50%...	$4.75
Old range, non-bessemer, 51.50%	4.60
Mesaba, bessemer, 51.50%...	4.60
Mesaba, non-bessemer, 51.50%.	4.45
High phosphorus, 51.50%.....	4.35

Foreign Ores*

C.i.f. Philadelphia or Baltimore. Exclusive of Duty

	Per Unit
African, Indian, 44 to 48% Mn.	57c. to 61c.
African, Indian, 49 to 51% Mn.	60c. to 65c.
Brazilian, 46 to 48% Mn...54c. to 59c.	
Cuban, del'd, duty free, 51% Mn.	67½c. to 71c.

	Per Short Ton Unit
Tungsten, Chinese, Wolframite, duty paid, delivered....$23 to	$24
Tungsten, domestic, scheelite, delivered	$23.00
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade).. ..	Nom.
Rhodesian, 45%	$25.00
Rhodesian, 48% ....$28.00 to	$30.00

RAILS, TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., gross ton.....	$40.00
Angle bars, 100 lb.....	2.70

F.o.b. Basing Points

Light rails (from billets), gross ton	$40.00
Light rails (from rail steel), gross ton	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel.....	2.15c.
Tie plates, Pacific Coast.....	2.30c.
Track bolts, steam railroads...	4.15c.
Track bolts, discount to jobbers all sizes (per 100 counts)....	65-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneaqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR *Per Net Ton*

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail....$20.00 to	$21.00
Domestic, f.o.b. Ohio River landing barges .....20.00 to	21.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines...20.00 to	21.00
Foreign, 85% calcium fluoride, not over 5% Si., c.i.f. Atlantic ports, duty paid.....Nominal	
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines....	31.00
As above, in bags, f.o.b. same mines	32.60

REFRACTORIES

Fire Clay Brick *Per 1000 f.o.b. Works*	
Super-duty brick at St. Louis..$60.80	
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey....	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois.....	42.75
Second quality, New Jersey....	49.00
No. 1 Ohio.....	39.90
Ground fire clay, per ton.....	7.10

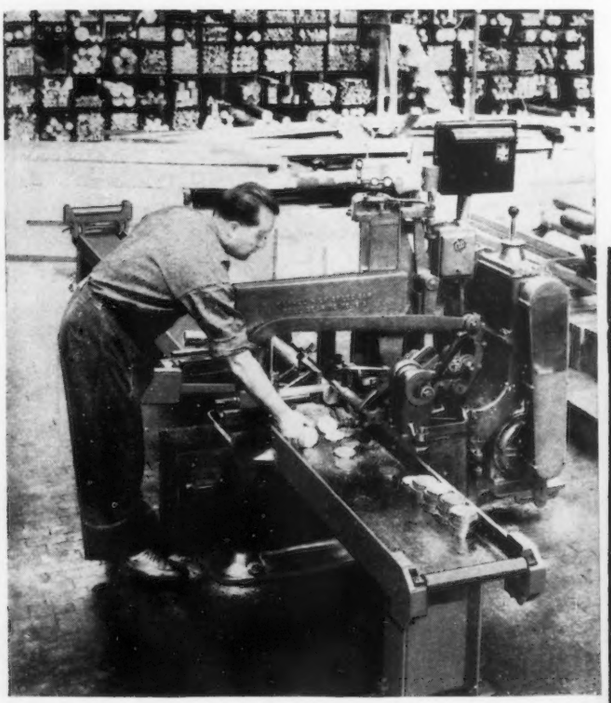
Silica Brick	
Pennsylvania $47.50	
Chicago District	55.10
Birmingham	47.50
Silica cement, net ton (Eastern)	8.55

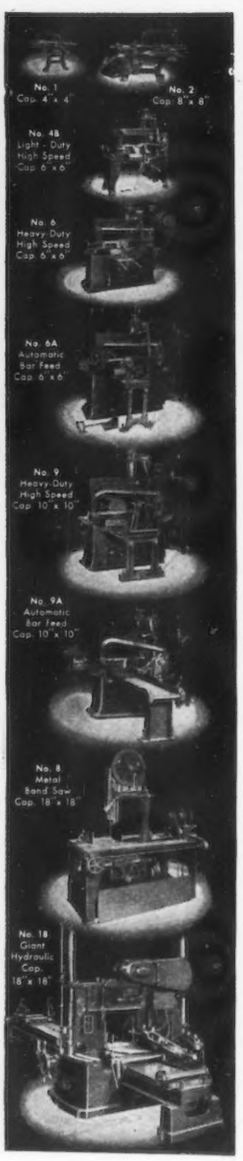
Chrome Brick *Net per Ton*	
Standard f.o.b. Baltimore, Plymouth Meeting and Chester..	$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	

Magnesite Brick	
Standard f.o.b. Baltimore and Chester $72.00	
Chemically bonded, f.o.b. Baltimore	61.00

Grain Magnesite	
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks).....(—)*	
Domestic, f.o.b. Baltimore and Chester in sacks $40.00	
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

*None available.





Pieces come cut-to-length from the Pratt & Whitney Stock Room . . .

There's no double handling of stock cut from bars at the Pratt & Whitney plant; no intermediate operations, no equipment tied up with slow cutting-off methods. Pieces, no matter how many, come from the stock room in slices or lengths ready for machining, because cutting-off has been made a stockroom operation by the new heavy duty, high speed MARVEL No. 9A Automatic Hack Saw with automatic bar push-up. Full length bars lift directly from storage racks to the bar push-up. With a few simple adjustments and the push of a starter button, pieces begin piling up at almost unbelievable speed, accurately cut off from large or nested bars. While the stock keeper attends to his many other duties, this large capacity, all-ball-bearing sawing machine AUTOMATICALLY feeds, AUTOMATICALLY measures and AUTOMATICALLY cuts-off identical pieces, stopping AUTOMATICALLY at any predetermined point.

Moreover, by simply disengaging the belt on the bar feed, a "production" run can be stopped at any point, a miscellaneous cut made, and automatic "production" work resumed by reengaging the bar push-up. MARVEL Production Saws, No. 6A and 9A, are today's fastest, most economical means for accurate cutting-off.

ARMSTRONG-BLUM MFG. CO.,
"The Hack Saw People"
5700 Bloomingdale Ave., Chicago, U.S.A.
Eastern Sales Office: 199 Lafayette St., New York

MARVEL SAWS

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload).....$120.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%.....$36.00
Domestic, 26 to 28%..... ... 49.50

Electric Ferrosilicon

Per Gross Ton, Delivered, Lump Size

50% (carload lots, bulk).....$74.50*
50% (ton lots, packed..... 87.00*
75% (carload lots, bulk).....135.00*
75% (ton lots, packed).....151.00*

Bessemer Ferrosilicon

Per Gross Ton, F.o.b. Jackson, Ohio

10.00 to 10.50%.....$34.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2% $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton, F.o.b. Jackson, Ohio

5.00 to 5.50%.....$28.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots Lump Size, on Contract

4 to 6% carbon.....11.00c.
2% carbon .....17.50c.
1% carbon .....18.50c.
0.10% carbon .....20.50c.
0.06% carbon .....21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon $113.00*
2.50% carbon 118.00*
2% carbon 123.00*
1% carbon 133.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W, del. carload..... $2.00
Ferrotungsten, 100 lb. and less 2.25
Ferrovanadium, contract, per lb. contained V, del'd $2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium f.o.b. Niagara Falls, N. Y., ton lots ..... $2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace, carload and contract, per net ton.....$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract per net ton.....$157.50

*Spot prices are $5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton 58.50

Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsato (Siglo), Tenn., 24%, per gross ton, $3 unitage, freight equalized with Nashville 75.00

Ferromolybdenum, per lb. Mo, f.o.b. furnace ..... 95c.

Calcium molybdate, per lb. Mo, f.o.b. furnace ..... 80c.
Molybdenum oxide briquettes 48-52% Mo, per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.

FUEL OIL

No. 3, f.o.b. Bayonne, N. J... ..4.70c.
No. 6, f.o.b. Bayonne, N. J.....3.21c.
No. 5 Bur. Stds., del'd Chicago..3.25c.
No. 6 Bur. Stds., del'd Chicago..2.75c.
No. 3 distillate, del'd Cleveland..5.50c.
No. 4 industrial, del'd Cleveland.5.25c.
No. 5 indus., del'd Cleveland...5.125c.
No. 6 indus., del'd Cleveland...4.875c.

147 STANDS OUT!

Wyandotte Metal Cleaner 147 is doing big things in a big way. When put to work electro cleaning zinc base die castings prior to plating it stands out for its swift action, for its thorough cleaning, for its economical work.

One plant cleans 50,000 pieces daily with Wyandotte 147.

Use Wyandotte 147 at four ounces to the gallon, with reverse current at 180° F., and you will find it leaves a beautiful color on the zinc base die casting without destroying the high lustre. There is no blistering when the plated parts are put through the drying oven at 275° F. after painting.

Wyandotte 147 has extremely long life in solution. It will pay you to ask your Wyandotte Service representative to demonstrate the high efficiency of this new Metal Cleaner. Call him today.

Wyandotte PRODUCTS

SERVICE REPRESENTATIVES IN 88 CITIES

THE J. B. FORD SALES CO.
WYANDOTTE, MICHIGAN

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, prompt .....$5.50 to $5.75

Foundry, f.o.b. Connellsville, prompt .....$6.00 to $6.50

F'dry, by-product, Chicago ... 10.50

F'dry, by-product, New England 13.75

Foundry, by-product, Newark or Jersey City .....$12.45 to $12.95

F'dry, by-product, Philadelphia. 12.13

F'dry, by-product, Cleveland... 12.05

F'dry, by-product, Cincinnati 11.00

Foundry, Birmingham 8.50

F'dry, by-product, St. Louis $10.75 to $11.00

BRITISH

Per Gross Ton, f.o.b. United Kingdom Ports

Ferromanganese, export £29 16s. 3d.

Tin plate, per base box. 32s. to 33s.

Steel bars, open hearth..£16 10s.

Beams, open hearth....£19 10s.

Channels, open hearth..£19 10s.

Angles, open hearth....£15 10s.

Black sheets, No. 24, gage £22 5s. max.* £22 5s. min.**

Galvanized sheets, No. 24 gage £25 12s. 6d. max.*; £25 12s. 6d. min.**

*Empire markets only.
**Other than Empire markets.

PIG IRON (Per Gross Ton)

Prices delivered various consuming points indicated by bold italics

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Boston	*$25.50*	*$25.00*	*$26.50*	*$26.00*	.....
Brooklyn	*27.50*	.....	.....	*28.00*	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....
Philadelphia	*25.84*	*25.34*	*26.84*	*26.34*	.....
Bethlehem, Pa.	$25.00	$24.50	$26.00	$25.50	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50
Birdsboro, Pa.	25.00	24.50	26.00	25.50	29.50
Sparrows Point, Md.	25.00	24.50	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....
Sharpsville, Pa.††	24.00	23.50	24.50	24.00	.....
Buffalo	24.00	23.00	25.00	24.50	29.50
Cincinnati	*24.44*	*24.61*	.....	*25.11*	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	.....
St. Louis	*24.50*	*24.02*	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	.....
Granite City, Ill.	24.00	23.50	24.50	24.00	.....
Cleveland	24.00	23.50	24.50	24.00	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....
Toledo	24.00	23.50	24.50	24.00	.....
Youngstown††	24.00	23.50	24.50	24.00	.....
Detroit	24.00	23.50	24.50	24.00	.....
St. Paul	*26.63*	.....	*27.13*	*26.63*	.....
Duluth	24.50	.....	25.00	24.50	.....
Birmingham	20.38	19.00	25.00	.....	.....
Los Angeles, San Francisco and Seattle	*27.50*	.....	.....	.....	.....
Provo, Utah	22.00	.....	.....	.....	.....
Montreal†	27.50	27.50	.....	28.00	.....
Toronto†	25.50	25.50	.....	26.00	....

GRAY FORGE

Valley or Pittsburgh fce.....$23.50

CHARCOAL

Lake Superior fce.....$27.00
Delivered Chicago 30.34

Base prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over. †On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

††Pittsburgh Coke & Iron and Struthers furnaces are quoting $24.50 a ton for No. 2 foundry, basic and malleable, and $25.00 a ton for bessemer iron at Sharpsville and Youngstown.

WAREHOUSE PRICES

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St Paul	Milwaukee	Los Angeles
Sheets, hot rolled	$3.35	$3.05	$3.35	$3.75	$3.58	$3.43	$3.25	$3.71	$3.45	$3.39	$3.30	$3.38	$4.30
Sheets, cold rolled	....	4.10	4.05	4.05	4.60	4.30	4.30	3.68		4.12	4.35	4.23	6.50
Sheets, galvanized	4.75	4.60	4.62	5.00	5.00	4.84	4.75	5.11	4.75	4.24	4.75	4.98	5.25
Strip, hot rolled	3.60	3.40	3.50	3.95	3.96	3.68*	3.82	4.06	3.70	4.99	3.65	3.73	...
Strip, cold rolled	3.20	3.30	3.20	3.31	3.51	3.20	3.52	3.46	....	3.61	3.83	3.54	.
Plates	3.40	3.55	3.40	3.75	3.76	3.60	3.62	3.85	3.55	3.69	3.80	3.68	4.15
Structural shapes	3.40	3.55	3.58	3.75	3.75	3.65	3.40	3.85	3.55	3.69	3.80	3.68	4.15
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.64	3.75	3.63	4.15
Bars, cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300	7.20	7.10	7.55	7.31	7.60	7.67	7.35	7.50	....	7.72	7.45	7.58	9.55
Bars, ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	....	6.02	6.00	5.88	8.55
Bars, cd. drn. SAE 2300	8.15	8.15	8.40	8.56	8.84	8.70	8.40	8.63	....	8.77	8.84	8.63	10.55
Bars, cd. drn. SAE 3100	6.75	6.75	7.75	7.16	7.19	7.05	6.75	7.23	....	7.12	7.44	6.98	9.55

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb., cold rolled strip, 0.0971 in. thick; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, shapes, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 24 ga.—1 to 6 bundles. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, $3.43.

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Many Outstanding Features! In addition, Frigidaire Water Coolers are unusually compact, have stainless steel top . . . bonderized sides . . . pre-cooler for speedier cooling . . . new Magic Action bubbler . . . self-cleansing tank . . . finger-tip temperature control . . . attractive appearance . . . optional foot pedal at slight extra cost . . . and many other advantages.

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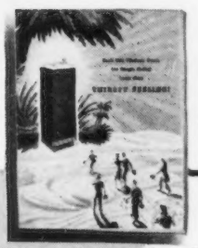
*Water cooled from 80° to 50° in 80° room, with 60% of water passing through pre-cooler.



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City and State ..... (IA-5)

Sales Possibilities

. . . CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic States

• **Eastern Machine Screw Corp.,** 150 Truman Street, New Haven, Conn., screw machine products, threading machines, parts, etc., has let general contract to W. H. Crute, Inc., 91 Howe Street, for one-story addition, 50 x 105 ft., with foundations for second floor later. Cost close to $60,000 with equipment. Harold H. Davis, 29 Whitney Avenue, is architect.

Atwood & Morrill Co., 48 Loring Avenue, Salem, Mass., operating a shipyard, with division for production of steam appliances, plans expansion for shipbuilding service for Government. Cost about $200,000. Fund in that amount is being secured through Navy Department for work; also will take bids soon on general contract for one-story addition. Cost over $50,000 with equipment. Andrews, Jones, Biscoe & Whitmore, 50 Congress Street, Boston, are architects.

Hygrade Sylvania Corp., Boston Street, Salem, Mass., radio vacuum tubes, electric lamps, etc., plans new works in Cushman district, Danvers, Mass. Cost over $200,000 with equipment. Company has arranged for purchase of plant property at Towanda, Pa., heretofore operated as a division of Patterson Screen Co., for production of fluorescent powder, and will continue operations as branch works for same line of output.

Scovill Mfg. Co., Inc., Oakville-American Fin Division, Oakville, Watertown, Conn., has approved plans for one-story addition, 50 x 230 ft., for storage and distribution. Cost over $50,000 with equipment.

United Aircraft Corp., Vought-Sikorsky Division, Stratford, Conn., plans further expansion, including one-story addition and installation of equipment for production of airplane parts and accessories for Navy Department, which will provide fund of about $365,900 for project.

New England Auto Body Works, Inc., 190 Wooster Street, New Haven, Conn., automobile bodies and parts, plans one-story shop addition. Cost close to $50,000 with equipment.

General Chemical Co., 40 Rector Street, New York, plans branch plant at West Monroe, La. Cost close to $100,000 with equipment. Company is a subsidiary of Allied Chemical & Dye Corp., New York.

Slater Electric & Mfg. Co., Inc., 291 Adams Street, Brooklyn, incandescent lamps and other electrical products, has leased about 11,000 sq. ft. in building at 718-28 Atlantic Avenue for expansion.

Ranger Engineering Corp., Farmingdale, L. I., aircraft engines and parts, a division of Fairchild Engine & Airplane Corp., plans early erection of several one-story units for parts production and assembling. Cost close to $1,500,000 with equipment. Albert Kahn Associated Architects & Engineers, Inc., Detroit, is architect and engineer.

Behr-Manning Corp., Tenth Avenue, Watervliet, N. Y., abrasive products, subsidiary of Norton Co., Worcester, Mass., has let general contract to Morton C. Tuttle Co., Park Square Building, Boston, for one-story addition, 140 x 400 ft. Cost close to $200,000 with equipment.

Board of Village Trustees, Tarrytown, N. Y., asks bids until May 12 for extensions and improvements in Eastview pumping station, including electrification of plant, with installation of two motor-driven pumping units and accessories, one combination electric motor and gasoline engine pump, high-pressure filter unit with capacity of 500,000-gal. per day, electric control apparatus and other equipment.

Ward Leonard Electric Co., South Street, Mount Vernon, N. Y., electric controllers, resistors, relays, etc., has leased one-story building, about 40,000 sq. ft. floor space, at 59-61 South Street, for expansion. Possession will be taken early in June.

Air Reduction Sales Co., 730 Grant Street, Buffalo, acetylene and oxygen welding and cutting equipment, etc., has approved plans for one-story addition. Cost over $60,000 with equipment.

Great Lakes Carbon Corp., Pine Avenue and Fifty-seventh Street, Niagara Falls, N. Y., electrodes and other graphite products, has let general contract to Walter S. Johnson Building Co., Inc., 2532 Hyde Park Boulevard, for one-story addition, 140 x 150 ft., for expansion in furnace department. Cost over $100,000 with equipment. A. L. Williams is company engineer.

National Aniline & Chemical Co., 1051 South Park Avenue, Buffalo, plans expansion, including five or six one-story additions, for increased output. Cost close to $1,000,000 with equipment.

Curtiss-Wright Corp., Vulcan and Kenmore Avenues, Buffalo, plans expansion in new plant at Cheektowaga, now nearing completion, including additional buildings and equipment for production for War Department. Cost about $1,731,000, fund in that amount to be secured through Government.

Newark Porcelain Enameling Co., Inc., 265 Watsessing Avenue, Bloomfield, N. J., is erecting one and two-story addition, 32 x 150 ft. Torchia & Amato, 247 Hoffman Boulevard, East Orange, N. J., is general contractor. Cost over $65,000 with equipment.

A. Abramson & Sons, 8-12 Livingston Street, Newark, N. J., scrap metals, have purchased plant of Edgcomb Steel Corp., 350-54 Frelinghuysen Avenue, consisting of main one-story building, 100 x 200 ft., and auxiliary structures, for new works and will install complete mechanical-handling equipment and facilities. Edgcomb company is building new plant at Hillside, N. J., and will remove to that location where increased capacity will be provided.

Titeflex Metal Hose Co., 500 Frelinghuysen Avenue, Newark, N. J., flexible metal hose and tubing, plans expansion for establishment of division for production of aircraft parts and accessories for Government, which will provide fund of $375,000.

A. B. Farquhar Co., Ltd., York, Pa., hydraulic presses, agricultural implements, etc., plans one-story addition for a welding shop; also will make other plant extensions and improvements. Cost over $60,000 with equipment.

Department of Supplies and Purchases, City Hall Annex, Philadelphia, Charles H. Grakelow, director, asks bids until May 13 for cast iron frames and covers (Class 335), and steel poles and brackets (Class 336).

Case Cutlery Co., Foster Brook, Bradford, Pa., plans new one-story plant, 90 x 115 ft. Cost over $65,000 with equipment. T. J. Hendryx, 165 Interstate Parkway, Bradford, is architect.

Quaker State Oil Refining Corp., Oil City, Pa., has approved plans for extensions and improvements in filter plant at Emlenton, Pa., refinery. Cost about $50,000 with equipment.

Mine Safety Appliances Co., 201 North Braddock Avenue, Pittsburgh, has awarded general contract to Navarro Corp., 6219 Broad Street, Pittsburgh, for modernization and improvements in seven one-story buildings at Callery, Pa., including new three-story and basement structure, 55 x 60 ft., and boiler house. Cost over $100,000 with equipment. Prack & Prack, Martin Building, Pittsburgh, are architects.

E. I. du Pont de Nemours & Co., Rubber Chemicals Division, du Pont Building, Wilmington, Del., plans expansion in neoprene synthetic rubber plant at Deepwater, N. J., practically doubling present capacity. Cost over $1,000,000 with machinery.

Procurement Division, Veterans' Administration, Arlington Building, Washington, asks bids until May 13 for hand trucks (Circular M-504).

Reid-Avery Co., Cleveland and Chesapeake Avenues, Baltimore, welding rods, etc., has let general contract to W. E. Bickerton Construction Co., 515 Cathedral Street, for one-story addition. Cost close to $50,000 with equipment.

Harry C. Weiskittel Co., Inc., 4901 Philadelphia Road, Baltimore, stoves and parts, cast iron pipe, etc., has let general contract to E. Eyring & Sons Co., 808 South Conkling Street, for one-story addition, 75 x 135 ft., for a foundry. Cost over $65,000 with equipment. John F. Eyring, 810 South Conkling Street, is architect.

Civil Aeronautics Administration, Commerce Building, Washington, asks bids until May 12 for prefabricated sectional steel building.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 13 for 168 gasoline engine-driven portable pumps and spare parts (Schedule 6559) for Eastern and Western yards.

The South

• **General Electric Co.,** Red Rock Building, Atlanta, Ga., has let general contract to Flagler Co., Techwood Drive, N. W., for one-story additions to factory branch, storage and distributing plant at 490 Glenn Street, S. W. Cost over $60,000 with equipment.

Air Corps, Albany Field, Albany, Ga., will begin work soon on new air corps flying school, including steel hangars, repair and reconditioning shops, engineering building, oil storage and distributing facilities, barracks and other structures. Award for building erection has been let to Hardaway Contracting Co., Columbus, Ga., at $2,884,000 exclusive of equipment.

Port Commission, Biloxi, Miss., will begin work soon on new boat-building and repair plant on East Back Bay, including one-story mechanical shops, storage and distributing buildings and other structures. Cost over $65,000 with equipment. I. Daniel Gehr, Tucci Building, is architect.

Coca-Cola Bottling Co., Suffolk, Va., has asked bids on general contract for new one-story mechanical-bottling, storage and distributing plant on West Washington Street. Cost close to $50,000 with equipment. A. Dupre Breeden, Suffolk, is architect.

Southern Car Wheel & Mfg. Co., 400 South Seventh Street, Birmingham, plans rebuilding part of plant recently destroyed by fire. Loss about $150,000 with equipment.

Kentucky Utilities Co., Paducah, Ky., plans expansion in steam-electric generating station, including new 12,500-kw. turbine-generator unit, high-pressure boiler and auxiliary equipment. Cost close to $500,000 with equipment.

James B. Beam Distilling Co., Clermont, Ky., plans extensions in distilling plant, including multi-story addition to storage and distributing department, and one-story addition to mechanical-bottling works. Cost close to $100,000 with equipment.

Decatur Iron & Steel Co., Decatur, Ala., iron and steel products, has approved plans for one-story addition for expansion in structural steel-fabricating department; also will install mechanical-handling equipment and make other improvements in present works. Cost over $60,000 with equipment.

War Department, Washington, plans new air corps technical school at Wichita Falls, Tex., including steel hangars, repair and reconditioning shops for aircraft and airplane engines, armament shops, oil and gasoline storage and fueling system, storage and dis-

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The Link-Belt line includes practically all types of mechanical handling equipment, including elevators of the belt and chain types—apron, pan, belt, screw, Bulk-Flo, overhead trolley, bucket carriers and conveyors; coil chain conveyors; furnace conveyors; feeder, transfer and catcher table conveyors; sheet pilers; draw bench and other equipment; cupola slag handling units; all-metal reciprocating shakeout conveyors for handling hot material; pouring conveyor platforms with non-skid plates; flight distributing conveyors for the automatic distribution of prepared sand; skip hoists for coke, coal and ashes, etc.; crawler and locomotive cranes.

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With anti-friction rollers — flat and troughing types for handling all loose materials — specially treated belts for hot shakeout sand.

Mold Conveyors

Continuous power type and gravity roll, standardized for different sizes and classes of work.

Screens

Vibrating and revolving sand screens for the removal of oversize debris. Revolving screens for lump-breaking action. Vibrating type screens for riddling and finer screening.

Mechanical Shakeout

The Vibro-Shakeout centralizes and speeds this operation. Also saves sand by better cleaning—eliminates damage to flasks—improves working conditions and greatly reduces operator fatigue. We also make air and mechanical jolting devices.

Muller Type Mixers

Also paddle and screw type for natural bank sands.

Revivifiers and Aerators

To aerate, "fluff" and cool prepared sand.

Prepared Sand Hoppers and Bins

With special foundry type gates and feeders.

Sand Reclamation Units

To clean and reclaim refuse and burnt core sand. Lower sand costs.

Feeders

"No Leak" apron feeders in different sizes and pitches to suit each particular operation; revolving table feeders from 24" dia. up to 10' dia. to suit material and capacity; reciprocating gate feeders for multiple compartment bins which are "Positive-Flo" with either wet or dry materials; new sand feeders with adjustable feed to regulate sand control and screw feeders for sea coal, bonding materials, etc.

Roto-Louvre Dryer

The unique principle on which this dryer operates enables it to dry core sand and molding sand at highest efficiency, and is equally successful in drying ammonium sulphate and metallurgical coal.

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Includes a complete line of malleable, Promal and steel chains of every type, speed reducers, variable speed transmissions, Friction Fighter ball and roller bearings—mounted and unmounted types, babbitted bearing pillow blocks of all types, clutches, couplings, pulleys, base plates, etc.

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LINK-BELT *Equipment for Materials Handling-Sand Preparation*

tributing buildings, laboratories, barracks and other structures. Cost about $6,000,000. Appropriation in that amount is being arranged. District engineer, United States Engineer Office, Citizens' National Bank Building, Denison, Tex., will be in charge.

Charles E. Smith Auto Parts Co., Ninth Street and Avenue J, Lubbock, Tex., automobile parts, is erecting one-story addition, 50 x 125 ft. John T. Glover, 1808 Thirteenth Street, is general contractor. Cost about $50,000 with equipment.

Central States

• **Federal Foundry Supply Co.,** 4600 East Seventy-first Street, Cleveland, foundry facings, core ovens and other foundry equipment, has asked bids on general contract for two-story addition, 60 x 140 ft., for expansion in machine shop; also for two-story office structure, 38 x 66 ft. Cost over $90,000 with equipment. Harlen E. Shimmin, Rogers Building, is architect.

Hoovens-Owens-Rentschler Co., Hamilton, Ohio, steam engines and parts, air compressors, etc., plans expansion, including several one-story additions and equipment for production of propelling machinery and parts for Navy. Fund of about $1,500,000 will be secured through Government for project.

Goodyear Aircraft Corp., East Market Street, Akron, Ohio, an interest of Goodyear Tire & Rubber Co., same address, recently organized, will begin superstructure at once for main one-story units for production of airplane parts for Government, for which general contract recently was let to Clemmer Construction Co., Akron. Plant will be located on 25-acre tract and will comprise several buildings for manufacture of bombers and other type fighting planes. Plans are under way for one-story drop hammer building and boiler plant. Cost about $3,700,000. Fund in that amount will be secured through Government.

Mitchell Metal Products, Inc., 6501 Cedar Avenue, Cleveland, metal stampings, sheet metal products, galvanized specialties, has asked bids on general contract for new plant, consisting of three main buildings, each one-story, 100 x 500 ft., for general production; 65 x 250 ft., for welding works and allied service; and 65 x 140 ft., for galvanzing department. Cost over $550,000 with equipment. Edward G. Hoefler, 5005 Euclid Avenue, is architect and engineer.

Firestone Tire & Rubber Co., Akron, Ohio, will begin superstructure at once for one-story addition, about 200,000 sq. ft. floor space, for production of gun mounts, carriages and allied equipment for Government. H. K. Ferguson Co., Hanna Building, Cleveland, is engineer and contractor. Cost over $500,000 with equipment. Company has work under way on one-story extension, over 25,000 sq. ft. of floor space, for which Ferguson company has award, for similar service. Cost over $85,000 with equipment.

Delco-Remy Division, General Motors Corp., Anderson, Ind., automobile starting and lighting equipment, etc., has let general contract to A. J. Glaser, 401 Lincoln Street, Muncie, Ind., for one-story addition, about 215,000 sq. ft. of floor space. Cost over $500,000 with equipment.

Johnson Furnace Co., 1425 Agnes Street, Kansas City, Mo., gas and coal furnaces, air-conditioning equipment, etc., has approved plans for one-story and basement addition, 40 x 100 ft., for storage and distribution. Cost about $40,000 with equipment. C. M. Williams, 4301½ Main Street, is architect.

National Aluminum & Brass Foundry, Inc., 1311 West Elm Street, Independence, Mo., has approved plans for one-story foundry addition to double present capacity. Cost over $45,000 with equipment.

Curtiss-Wright Corp., Lambert-St. Louis Flying Field, St. Louis, plans further expansion in aircraft-manufacturing plant in course of construction at St. Louis for production of military planes for War Department. Additional buildings will be erected and equipment installed to cost about $1,673,460. Initial plant will represent an investment of $13,471,000. Appropriation for entire project has been secured through Defense Plant Corp., Washington, Federal agency.

War Department, Washington, plans new air depot at Oklahoma City, Okla., comprising hangars, maintenance and repair shops for aircraft, machine shops for armament, equipment storage and distributing buidings, salvage yards, oil and gasoline storage and fueling facilities, barracks and other structures. Cost about $14,000,000. Appropriation in that amount is being arranged.

National Twist Drill & Tool Co., 6522 Brush Street, Detroit, twist drills, reamers, milling cutters, etc., has let general contract to Austin Co., Cleveland, for one-story addition to branch plant at Rochester, Mich. Cost about $150,000 with equipment.

Rademaker Chemical Corp., Eastlake, Mich., plans one-story addition for production of magnesite specialties. Cost about $300,000 with equipment. Financing in that amount has been arranged through RFC.

Michigan Molded Plastics Co., Dexter, Mich., is erecting two one-story additions for expansion in processing division, and for storage and distribution, respectively. Cost about $50,000 with equipment.

Kalamazoo Stove & Furnace Co., Rochester Avenue, Kalamazoo, Mich., plans one-story addition. Cost close to $60,000 with equipment. Stewart-Kingscott Co., Kalamazoo, is architect.

National Cold Forging Corp., 5919 Tireman Avenue, Detroit, cap screws, formed and threaded rods, etc., plans new one-story plant at Dearborn, Mich., with office building adjoining. Cost over $65,000 with equipment.

Williams Mfg. Co., Inc., 159 Brook Street, Elgin, Ill., metal furniture specialties, etc., has let general contract to Illinois Hydraulic Stone & Construction Co., 20 North Crystal Street, for one-story addition, 40 x 200 ft. Cost close to $70,000, with equipment. LeRoy Thompson, 355 Congdon Avenue, is architect.

William D. Gibson Co., Division of Associated Spring Corp., 1800 North Clybourn Avenue, Chicago, steel springs, has let general contract to Gerhardt F. Meyne Co., 7 South Dearborn Street, for one, four and five-story addition, and improvements in present plant. Cost over $100,000 with equipment. Shaw, Naess & Murphy, 80 East Jackson Boulevard, are architects.

Heil Co., 3000 West Montana Avenue, Milwaukee, iron and steel tanks, truck body hoists, etc., has let general contract to Klug & Smith Co., 111 East Wisconsin Avenue, for one-story addition, 125 x 125 ft., to plant No. 1, at 2830 South Thirty-second Street, for expansion in machine shop. Cost over $100,000 with equipment.

Paul Pufahl & Son Foundry Co., Talmadge Street and Thirty-third Avenue, S. E., Minneapolis, steel castings, has let general contract to W. A. South Co., 126 South Tenth Street, for two-story plant, 90 x 155 ft., at Belt Line Bridge and Como Avenue, for ordnance production for Government. Cost close to $75,000 with equipment.

City Council, Hawarden, Iowa, plans expansion and improvements in municipal power plant, including new 1000-kw. generating unit and auxiliary equipment. Cost about $92,000. Buell & Winter Engineering Co., Insurance Exchange Building, Sioux City, Iowa, is consulting engineer.

City Council, Watertown, S. D., asks bids until May 19 for expansion and improvements in municipal power plant, including equipment. Cost about $165,000. Ralph D. Thomas & Associates, Inc., 1200 Second Avenue South, Minneapolis, is consulting engineer.

Western States

• **Bellingham Plywood Co.,** Bellingham National Bank Building, Bellingham, Wash., Victor Olson, manager, plans new one-story mill, 225 x 400 ft., at Ninth and Harris Streets, to include a steam-electric power plant, machine shop and other structures. Mechanical-handling and other equipment will be installed. Cost about $625,000 with machinery. Henry Ward Beecher, Securities Building, Seattle, is consulting engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 13 for 1500 carbon steel boiler tubes (Schedule 6564) for Mare Island Navy Yard.

Littlefuse Corp., 4757 North Ravenswood Avenue, Chicago, electric fuses and other electrical products, plans new one-story branch plant at El Monte, Cal. Cost close to $50,000 with equipment. H. Miller, 4814 Loma Vista Boulevard, Los Angeles, is architect.

Fruehauf Trailer Co., 300-04 Michigan Street, Seattle, plans one-story addition, 60 x 200 ft., for parts production and assembling. Cost over $85,000 with equipment. Henry Bittman, Securities Building, is architect.

Bureau of Reclamation, Denver, asks bids until May 26 for one 30,000-kva. electric generator, with thrust and upper and lower guide bearings, surface coolers, main exciter and pilot exciter, and accessory equipment for installation in Parker Dam hydroelectric power plant, Parker Dam power project, Arizona-California (Specification 961); also until May 15 for motor-control equipment for pumping station "D," Modoc Unit, Tule Lake Division, Klamath project, Oregon-California (Specification 1506-D).

California Steel Products Co., 490 Bay Street, San Francisco, fabricated steel products, plans new one-story fabricating works at Richmond, Cal. Cost over $70,000 with equipment.

Canada

• **Modern Tool Works, Ltd.,** 15 Van Horne Street, Toronto, Ont., has let general contract to Anglin-Norcross Ontario, Ltd., 57 Bloor Street West, for new one-story plant on Clarkson Avenue. Cost close to $85,000 with equipment. Allward & Gouinlock, 57 Bloor Street West, are architects.

Irvington Varnish & Insulator Co., Ltd., Hamilton, Ont., has asked bids on general contract for new one-story plant, 120 x 325 ft. Cost close to $150,000 with equipment.

Union Twist Drill Co., Ltd., Rock Island, Que., drills, reamers and other cutting tools, plans one-story addition. Cost close to $60,000 with equipment.

Canadian Pacific Railway Co., Ltd., Windsor Station, Montreal, will begin superstructure for one-story shop addition at repair yards at Weston, Man., for which general contract recently was let to Bird Construction Co., Confederation Building, Winnipeg, Man. Cost about $55,000 with equipment.

Lion Grinding Wheels, Ltd., Pearl Street East, Brockville, Ont., has awarded general contract to Walter Patterson, 35 William Street, for plant addition to cost $50,000.

General Motors Corp. of Canada, Ltd., William Street East, Oshawa, Ont., has awarded general contract to H. A. Wickett & Co., Ltd., 156 Front Street, Toronto, for $150,000 plant addition.

Standard Sanitary & Dominion Radiator, Ltd., 800 Lansdowne Avenue, Toronto, has awarded general contract to Milne & Nichols, 57 Bloor Street West, Toronto, for plant addition to cost about $100,000 with equipment. Prack & Prack, 36 James Street South, Hamilton, Ont., are architects.

Atlas Steels, Ltd., Main Street, Welland, Ont., has let structural steel contract to Hamilton Bridge Co., Hamilton, Ont., for plant addition to cost $100,000. Pigott Construction Co., Pigott Building, Hamilton, is general contractor.

Montreal Light, Heat & Power Consolidated, 107 Craig Street West, Montreal, has awarded general contract to Bremner Norris & Co., Ltd., 2049 McGill College Avenue, Montreal, for a $150,000 sub-station at 1633 St. James Street West.

Aluminum Co. of Canada, Ltd., 1010 St. Catharine Street West, Montreal, has started work on power dam at Lac Manuhan, Que., to cost $1,000,000.